No. 23-636

**IN THE UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT**

WATERKEEPER ALLIANCE, CENTER FOR BIOLOGICAL DIVERSITY, CLEAN WATER ACTION, FOOD & WATER WATCH, SURFRIDER FOUNDATION, ENVIRONMENT AMERICA, BAYOU CITY WATERKEEPER, BLACK WARRIOR RIVERKEEPER, HEALTHY GULF, SAN ANTONIO BAY ESTUARINE WATERKEEPER, TENNESSEE RIVERKEEPER, and SAN FRANCISCO BAYKEEPER,

Petitioners,

v.

U.S. ENVIRONMENTAL PROTECTION AGENCY and MICHAEL S. REGAN, Administrator, in his official capacity as Administrator of the United States Environmental Protection Agency,

Respondents.

Petition for Review of Final Agency Action of the
United States Environmental Protection Agency

**EXCERPTS OF RECORD
VOLUME 2 OF 7**

United States Government Accountability Office

GAO

Report to the Ranking Member, Subcommittee on Water Resources and Environment, Committee on Transportation and Infrastructure, House of Representatives

September 2012

WATER POLLUTION

EPA Has Improved Its Review of Effluent Guidelines but Could Benefit from More Information on Treatment Technologies

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Highlights

Highlights of GAO-12-845, a report to the Ranking Member, Subcommittee on Water Resources and Environment, Committee on Transportation and Infrastructure, House of Representatives

September 2012

WATER POLLUTION

EPA Has Improved Its Review of Effluent Guidelines but Could Benefit from More Information on Treatment Technologies

Why GAO Did This Study

Under the Clean Water Act, EPA has made significant progress in reducing wastewater pollution from industrial facilities. EPA currently regulates 58 industrial categories, such as petroleum refining, fertilizer manufacturing, and coal mining, with technology-based regulations called effluent guidelines. Such guidelines are applied in permits to limit the pollutants that facilities may discharge. The Clean Water Act also calls for EPA to revise the guidelines when appropriate. EPA has done so, for example, to reflect advances in treatment technology or changes in industries.

GAO was asked to examine (1) the process EPA follows to screen and review industrial categories potentially needing new or revised guidelines and the results of that process from 2003 through 2010; (2) limitations to this process, if any, that could hinder EPA's effectiveness in advancing the goals of the Clean Water Act; and (3) EPA's actions to address any such limitations.

GAO analyzed the results of EPA's screening and review process from 2003 through 2010, surveyed state officials, and interviewed EPA officials and experts to obtain their views on EPA's process and its results.

What GAO Recommends

GAO is making recommendations to improve the effectiveness of EPA's effluent guidelines program by expanding its screening phase to better assess hazards and advances in treatment technology. EPA agreed with two recommendations in principle and said it is making progress on them, but said that one is not workable given current agency resources. GAO believes improvements can be made.

View GAO-12-845. For more information, contact David Trimble at (202) 512-3841 or trimbled@gao.gov

What GAO Found

The Environmental Protection Agency (EPA) uses a two-phase process to identify industrial categories potentially needing new or revised effluent guidelines to help reduce their pollutant discharges. EPA's 2002 draft *Strategy for National Clean Water Industrial Regulations* was the foundation for EPA's process. In the first, or "screening," phase, EPA uses data from two EPA databases to rank industrial categories according to the total toxicity of their wastewater. Using this ranking, public comments, and other considerations, EPA has identified relatively few industrial categories posing the highest hazard for the next, or "further review," phase. In this further review phase, EPA evaluates the categories to identify those that are appropriate for new or revised guidelines because treatment technologies are available to reduce pollutant discharges. Since 2003, EPA has regularly screened the 58 categories for which it has issued effluent guidelines, as well as some potential new industrial categories, and it has identified 12 categories for its further review phase. Of these 12 categories, EPA selected 3 for updated or new effluent guidelines. EPA chose not to set new guidelines for the others.

Limitations in EPA's screening phase may have led it to overlook some industrial categories that warrant further review for new or revised effluent guidelines. Specifically, EPA has relied on limited hazard data that may have affected its ranking of industrial categories. Further, during its screening phase, EPA has not considered the availability of advanced treatment technologies for most industrial categories. Although its 2002 draft strategy recognized the importance of technology data, EPA has stated that such data were too difficult to obtain during the screening phase and, instead, considers them for the few categories that reach further review. Officials responsible for state water quality programs and experts on industrial discharges, however, identified categories they believe EPA should examine for new or updated guidelines to reflect changes in their industrial processes and treatment technology capabilities. According to some experts, consideration of treatment technologies is especially important for older effluent guidelines because changes are more likely to have occurred in either the industrial categories or the treatment technologies, making it possible that new, more advanced treatment technologies are available.

Recognizing the limitations of its hazard data and overall screening approach, EPA has begun revising its process but has not assessed other possible sources of information it could use to improve the screening phase. In 2012, EPA supplemented the hazard data used in screening with four new data sources. EPA is also developing a regulation that, through electronic reporting, will increase the completeness and accuracy of its hazard data. In 2011, EPA also began to obtain recent treatment technology literature. According to EPA, the agency will expand on this work in 2013. Nonetheless, EPA has not thoroughly examined other usable sources of information on treatment technology, nor has it reassessed the role such information should take in its screening process. Without a more thorough and integrated screening approach that both uses improved hazard data and considers information on treatment technology, EPA cannot be certain that the effluent guidelines program reflects advances in the treatment technologies used to reduce pollutants in wastewater.

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Abbreviations

EPA	Environmental Protection Agency
NPDES	National Pollutant Discharge Elimination System

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United States Government Accountability Office
Washington, DC 20548

September 10, 2012

The Honorable Timothy H. Bishop
Ranking Member
Subcommittee on Water Resources and Environment
Committee on Transportation and Infrastructure
House of Representatives

Dear Mr. Bishop:

Forty years after the Clean Water Act set a national goal of eliminating the discharge of pollutants into navigable U.S. waters, the Environmental Protection Agency (EPA) has made significant progress in reducing pollution from industrial facilities; nevertheless, pollution from these facilities continues to cause concern.[1] EPA's actions to reduce this pollution have included establishing national technology-based regulations—or effluent guidelines—for separate industrial categories, such as petroleum refining, fertilizer manufacturing, coal mining, and metal finishing. EPA issued the vast majority of these regulations in the 1970s and 1980s and has revised most of them; revisions may range from changes in testing methods to establishment of more stringent standards. Relatively few effluent guidelines have been revised or created in recent years, however, and environmental advocacy groups continue to raise concerns because industrial facilities annually discharge hundreds of billions, and perhaps trillions of pounds of pollutants to U.S. waters. According to EPA, industrial pollutants may contribute, in part, to impaired water quality; harm aquatic life; and limit the ways in which people can safely use the nation's waters.

One of EPA's main responsibilities under the act is to regulate "point source" pollution—that is, pollution such as effluent or wastewater coming from a discrete point, such as a pipe from an industrial facility. The Clean Water Act directed EPA to establish effluent guidelines to achieve pollutant reductions using specific treatment technologies or changes in a facility's production processes. In establishing and revising effluent

[1]The Federal Water Pollution Control Act Amendments of 1972, Pub. L. No. 92-500, § 2, 86 Stat. 816, codified as amended at 33 U.S.C. §§ 1251-1387 (2012) (commonly referred to as the Clean Water Act). For consistency throughout this report, we refer to the statute and its amendments as the Clean Water Act.

guidelines, EPA is to assess (1) the performance and availability of the best pollution control technologies or pollution prevention practices for an industrial category; (2) the economic achievability of those technologies; (3) non-water-quality environmental impacts, such as the energy required to reduce pollutants; and (4) other factors that the EPA Administrator deems appropriate, such as the risk posed by discharges. The legislative history of relevant provisions in the Clean Water Act suggests that effluent guidelines were expected to be revised and made more stringent over time to reflect technological advances.

To carry out its effluent guidelines program, EPA develops regulations setting national effluent guidelines, and states generally implement the program by applying limits in permits that they issue to specific facilities. Under the National Pollutant Discharge Elimination System (NPDES) program, all facilities that discharge pollutants from any point source into U.S. waters are required to obtain a permit, typically from their state or EPA region. Under the Clean Water Act, EPA has authorized 46 states to issue NPDES permits and retains the authority to issue permits for the remaining 4 states: Idaho, Massachusetts, New Hampshire, and New Mexico.[2]

The Clean Water Act requires that after setting effluent guidelines, EPA is to annually review each existing effluent guideline—that is, guidelines for regulated industrial categories—to determine whether revising these guidelines would be appropriate. In addition, at least every 2 years, EPA is to identify industrial categories that do not have effluent guidelines but that discharge nontrivial amounts of toxic or certain other pollutants.[3] At least every 2 years, EPA is required to publish schedules for its annual review and revision of existing effluent guidelines and for promulgating effluent guidelines for any newly identified categories. The agency's intent is to issue a plan every year, with preliminary plans to be issued in odd

[2]In addition to the 46 states, the territory of the U.S. Virgin Islands is authorized to issue NPDES permits. The remaining territories and the District of Columbia are not authorized to issue these permits.

[3]A Senate committee report explaining the addition of this provision to the Water Quality Act of 1987, noted in part, "[g]uidelines are required for any category of sources discharging significant amounts of toxic pollutants. In this use, 'significant amounts' does not require the Administrator to make any determination of environmental harm; any non-trivial discharges from sources in a category must lead to effluent guidelines." S. Rep. 99-50 at 24-25 (1985). See also 69 Fed. Reg. 53,707 (Sept. 2, 2004).

years and final plans for effluent guidelines in even years. If EPA decides that an industrial category requires new or revised effluent guidelines, it generally establishes them through a regulatory process that involves proposing new effluent guidelines, obtaining public comment, making revisions, and publishing a final regulation.

Throughout much of the effluent guidelines program's history, EPA's schedule for issuing effluent guidelines has been driven by litigation and resulting consent decrees.[4] In 2002, following extensive consultation with an advisory task force formed in response to a 1992 consent decree, EPA issued a draft *Strategy for National Clean Water Industrial Regulations*, outlining a new process by which it planned to meet the requirement to review industries in the future to determine whether new or revised effluent guidelines were appropriate. The draft strategy calls for EPA to conduct an annual screening of industrial categories to consider (1) the risks the industrial categories pose to human health or the environment; (2) the availability of treatment technology or other approaches to reduce the risk; (3) the cost, performance, and affordability of the technology; and (4) implementation and efficiency considerations. EPA derived these screening factors in part from the statutory requirements for developing or revising effluent guidelines. Following screening with available information, the draft strategy calls for EPA to conduct a further review of selected categories. The further reviews may take 1 or more years to complete. EPA has not finalized or formally updated its draft strategy, although according to EPA officials, the draft has served in part as the basis for the agency's annual reviews of industrial categories after 2002.

As EPA's regulatory efforts have reduced pollutants from industrial point sources over the past several decades, the agency has placed greater emphasis on what is now the primary reason for impairment of the nation's waters, namely diffuse or nonpoint pollution, such as some agricultural runoff. In light of that change in emphasis and soon after issuing the draft strategy, EPA reduced staffing levels for the effluent guidelines program by about 40 percent, according to program officials. EPA issued its most recent effluent guidelines—for airport deicing, a previously unregulated industry—in May 2012. Before that, EPA's most recent revisions of existing effluent guidelines were for concentrated

[4]Consent decrees are settlement agreements signed by the parties and entered, or approved, by a court; they are therefore enforceable by the courts.

animal feeding operations in 2008 and construction and development in 2009.[5] Most effluent guidelines have not been revised since the 1980s or 1990s.

In this context, you asked us to review EPA's effluent guidelines program. This report examines (1) the process EPA follows to screen and review industrial categories potentially in need of new or revised effluent limitation guidelines and the results of that process from 2003 through 2010; (2) limitations to this screening and review process, if any, that could hinder the effectiveness of the effluent guidelines program in advancing the goals of the Clean Water Act; and (3) what actions EPA has taken or could take to address limitations, if any, that exist.

To address our objectives, we reviewed the Clean Water Act and relevant regulations, EPA's 2002 draft strategy, effluent guidelines program plans, and associated supporting documents. We also reviewed EPA's screening decisions for all industrial categories and its further reviews for the 12 industrial categories selected through screening from 2003 through 2010.[6] Our purpose was to identify those industries that EPA had only initially screened and those that received a further review, including an examination of available treatment technologies. We also documented the status of regulatory actions and other steps that EPA took for industries that it reviewed further. In addition, we interviewed officials in EPA's Engineering and Analysis Division to learn about the process the agency follows to screen and review industries potentially in need of new or revised effluent limitation guidelines. We then compared the steps specified in the draft strategy with the agency's current process for screening and reviewing industries for possible revised guidelines. To better understand the steps in the current process as they apply to specific industrial categories, we conducted detailed interviews with EPA staff regarding 7 of the 12 industrial categories that EPA selected from 2003 onward for possible new or revised effluent guidelines. We chose 2003 because it was the year when EPA issued its first preliminary effluent guidelines plan after developing its 2002 draft strategy for

[5]EPA stayed a portion of the guideline for the construction and development industrial category that established a numerical effluent limitation for turbidity, but other portions of the guidelines remain in effect. See 75 Fed. Reg. 68215 (Nov. 5, 2010), 40 C.F.R. pt. 450.

[6]As of August 2012, EPA had not published a preliminary effluent guidelines program plan for 2011.

screening and reviewing industries. We also conducted 17 interviews with 22 experts from academia, industry, nonprofit organizations, and state and local water quality agencies for their perspectives on EPA's effluent guidelines program. We selected these experts from a list of approximately 50 individuals identified from a variety of sources, including referrals from EPA, the Association of Clean Water Agencies, the National Association of Clean Water Agencies, and other experts; relevant academic literature; and litigation documents. Because we used a nonprobability sampling method to select experts, the results of our interviews with them cannot be generalized to all experts on the program, but the information derived from interviewing these experts provided illustrative observations and examples. We also surveyed the directors for water quality permits in the 46 states authorized to issue NPDES permits about the adequacy of current effluent guidelines; the results of our analysis are not generalizable to all industrial categories in all states. Using the results of the survey, we selected an industrial category that state officials said warranted revised effluent guidelines and interviewed state officials to learn more about the reasons for their views. We also interviewed EPA officials about their plans, if any, related to those industries. Appendixes I and II present a more detailed description of our scope and methodology.

We conducted this performance audit from September 2011 to September 2012, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Tens of thousands of industrial facilities directly discharge wastewater into the waters of the United States and are subject to permit limits on their discharges, which for certain industries are determined by effluent guidelines set by EPA under the Clean Water Act. For certain industries, EPA issues a similar type of regulation—pretreatment standards—applicable to facilities that are indirect dischargers; that is, their effluent goes to wastewater treatment plants, which then discharge the collected and treated wastewater into a water body. To establish pollutant control limits for different pollutants in these guidelines or standards, EPA groups industrial facilities into categories that have similar products or services. To date, EPA has issued effluent guidelines or pretreatment standards for 58 industrial categories. EPA has issued effluent guidelines for 57 of the

58 categories and pretreatment standards for 35 of the 58 categories.[7] Table 1 lists industrial categories that are regulated by effluent guidelines and pretreatment standards. According to EPA, there are approximately 35,000 to 45,000 direct dischargers covered by effluent guidelines and about 10,000 facilities that discharge indirectly to wastewater treatment plants.

Table 1: Industrial Categories with Effluent Guidelines and Pretreatment Standards as of August 2012

Industrial category	Effluent guideline	Pretreatment standard
Airport deicing	X	
Aluminum forming	X	X
Asbestos manufacturing	X	
Battery manufacturing	X	X
Canned and preserved fruits and vegetables processing	X	X
Canned and preserved seafood processing	X	
Carbon black manufacturing	X	X
Cement manufacturing	X	
Centralized waste treatment	X	X
Coal mining	X	
Coil coating	X	X
Concentrated animal feeding operations	X	X
Concentrated aquatic animal production	X	
Construction and development	X	
Copper forming	X	X
Dairy products processing	X	
Electrical and electronic components	X	X
Electroplating		X

[7]Throughout this report, we use the term effluent guidelines to refer to effluent guidelines and pretreatment standards collectively. Some industrial categories are made up of direct dischargers, some of indirect dischargers, and some have a mix of both. Thirty-four of the 58 industrial categories are regulated by both effluent guidelines and pretreatment standards because these categories comprise both direct and indirect dischargers. Twenty-three industrial categories are regulated by effluent guidelines but not pretreatment standards, while the electroplating industrial category is regulated by pretreatment standards but not by effluent guidelines.

Industrial category	Effluent guideline	Pretreatment standard
Explosives manufacturing	X	
Ferroalloy manufacturing	X	
Fertilizer manufacturing	X	X
Glass manufacturing	X	X
Grain mills	X	X
Gum and wood chemicals manufacturing	X	
Hospital	X	
Ink formulating	X	X
Inorganic chemicals manufacturing	X	X
Iron and steel manufacturing	X	X
Landfills	X	
Leather tanning and finishing	X	X
Meat and poultry products	X	
Metal finishing	X	X
Metal molding and casting	X	X
Metal products and machinery	X	
Mineral mining and processing	X	
Nonferrous metals forming and metal powders	X	X
Nonferrous metals manufacturing	X	X
Oil and gas extraction	X	X
Ore mining and dressing	X	
Organic chemicals, plastics, and synthetic fibers	X	X
Paint formulating	X	X
Paving and roofing materials (tars and asphalt)	X	X
Pesticide chemicals	X	X
Petroleum refining	X	X
Pharmaceutical manufacturing	X	X
Phosphate manufacturing	X	
Photographic	X	
Plastics molding and forming	X	
Porcelain enameling	X	X
Pulp, paper, and paperboard	X	X
Rubber manufacturing	X	X
Soap and detergent manufacturing	X	X
Steam electric power generating	X	X
Sugar processing	X	

Industrial category	Effluent guideline	Pretreatment standard
Textile mills	X	
Timber products processing	X	
Transportation equipment cleaning	X	X
Waste combustors	X	X
Total	**57**	**35**

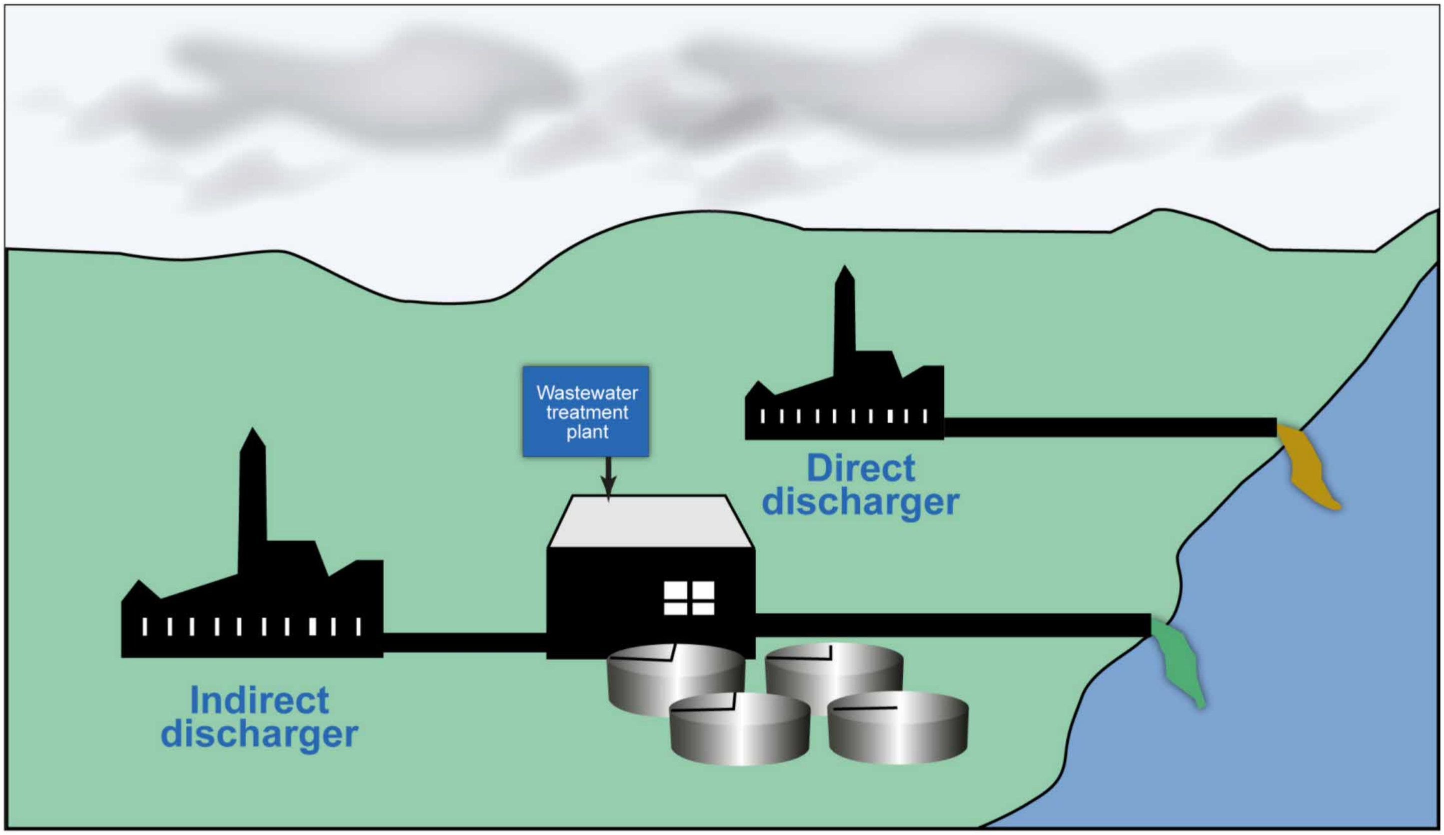
Source: GAO analysis of EPA data.

National Pollutant Discharge Elimination System Permits

Before an industrial facility discharges pollutants, it must receive a permit that is to, at a minimum, incorporate any relevant pollutant limits from EPA's effluent guidelines. Where needed to protect water quality as determined by standards set by individual states, NPDES permits may include limits more stringent than the limits in the guidelines. NPDES permits for direct dischargers are issued by 1 of the 46 states authorized by EPA to issue them and by EPA elsewhere. Unlike direct dischargers, indirect dischargers, which do not discharge to surface waters, do not require an NPDES permit. Instead, an indirect discharger must meet EPA's national pretreatment standards and may have to meet additional pretreatment conditions imposed by its local wastewater treatment plant.[8] Under the national pretreatment standards and conditions, an indirect discharger is required to remove pollutants that may harm wastewater treatment plant operations or workers or, after treatment and discharge, cause violations of the wastewater treatment plant's permit. Figure 1 illustrates both types of facilities subject to regulation.

[8]Wastewater treatment plants generally must have a NPDES permit to operate.

Figure 1: Industrial Facilities Subject to Regulation of Discharges



Source: EPA documentation.

To get an NPDES permit, industrial facilities' owners—like any source discharging pollutants as a point source—must first submit an application that, among other things, provides information on their proposed discharges. Water quality officials in authorized states and EPA regional offices responsible for the NPDES program in the four nonauthorized states review these applications and determine the appropriate limits for the permits. Those limits may be technology-based effluent limits, water quality-based effluent limits, or a combination of both. Technology-based limits must stem from either effluent limitation guidelines, when applicable, or from the permit writer's best professional judgment when no applicable effluent limitation guidelines are available. Using best professional judgment, permit writers are to develop technology-based permit conditions on a case-by-case basis, considering all reasonably available and relevant information, as well as factors similar to those EPA uses in developing guidelines for national effluent limitations. A permit

writer should also set water quality-based limits more stringent than technology-based limits if necessary to control pollutants that could cause or contribute to violation of a state's water quality standards. To support each permit, permit writers are supposed to develop a fact sheet, or similar documentation, briefly summarizing the key facts and significant factual, legal, methodological, and policy questions considered.[9] The fact sheet and supporting documentation also serve to explain to the facility, the public, and other interested parties the rationale and assumptions used in deriving the limitations in the permit.

Facilities with NPDES permits are required to monitor their discharges for the pollutants listed in their permits and to provide monitoring reports with their results to their permitting authority (the relevant state, tribal, or territorial agency authorized to issue NPDES permits or, in nonauthorized locations, EPA). For facilities designated by EPA regional administrators and the permitting authorities as major facilities, the permitting authorities are in turn required to transfer the monitoring report data to EPA headquarters. These reports, known as discharge monitoring reports, are transmitted electronically and stored in an electronic database or reported in documents and manually entered into the electronic database for use by EPA in reviewing permit compliance.[10] Permitting authorities are not required to report the discharge monitoring results from all remaining facilities, known as minor facilities, to EPA but may do so. According to EPA, there are about 6,700 major and 40,500 minor facilities covered by NPDES permits.

[9]EPA regulations require permit writers to document the reasoning behind a facility's permit. A fact sheet is required to accompany the permit for facilities designated by EPA regional administrators and the permitting authorities to be major dischargers. A statement of basis is required for permits issued to all other facilities, which EPA considers minor facilities. For purposes of this report, we refer to both fact sheets and statements of basis as "fact sheets." See EPA, *NPDES Permit Writers Manual* at 11-10, 40 C.F.R. §§ 124.7, 124.8, 124.56, 123.25 (2012).

[10]EPA and the states are making a transition from one national database, known as the Permit Compliance System, to another known as the Integrated Compliance Information System: NPDES. The states are divided in their use of the two databases. Consequently, two databases contain discharge-monitoring reports. In our report, however, we refer to them collectively as "the database."

Facilities may also be required to report data to EPA's Toxics Release Inventory on their estimated wastewater discharges.[11] This inventory contains annual estimates of facilities' discharges of more than 650 toxic chemicals to the environment. One of the inventory's primary purposes is to inform communities about toxic chemical releases to the environment, showing data from a wide range of mining, utility, manufacturing, and other industries subject to the reporting requirements. As such, although the inventory is unrelated to the NPDES program, the Toxics Release Inventory contains estimated discharges of toxic pollutants for many NPDES-permitted facilities. Not all industrial categories covered by effluent guidelines—the oil and gas industrial category, for example—are necessarily required to report to the inventory.

Effluent Guidelines Program

Under the Clean Water Act, EPA must establish effluent guidelines for three categories of pollutants—conventional, toxic, and nonconventional pollutants—and several levels of treatment technology. As defined in EPA's regulations, conventional pollutants include biological oxygen demand,[12] total suspended solids,[13] fecal coliform bacteria,[14] oil and grease, and pH.[15] The Clean Water Act designates toxic pollutants as

[11]Specifically, certain facilities that manufacture, process, or otherwise use any of the listed individual chemicals and chemical categories are required to report annually to EPA and their respective state those chemicals used above threshold quantities, the amounts released to the environment, and whether the releases entered the air, water, or soil. 42 U.S.C. § 11023 (2012).

[12]Biological oxygen demand is a measure of the oxygen used during decomposition of organic material over a specified period (usually 5 days) in a wastewater sample; it represents the readily decomposable organic content of wastewater.

[13]A measure of filterable solids present in a sample, as determined by the method specified in 40 C.F.R. pt. 136.

[14]Fecal coliform are bacteria whose presence indicates that water may be contaminated by human or animal wastes.

[15]A measure of the hydrogen ion concentration of water or wastewater expressed as the negative logarithm of the hydrogen ion concentration in milligrams per liter. A pH of 7 is neutral, a pH less than 7 is acidic, and a pH greater than 7 is basic.

those chemicals listed in a key congressional committee report,[16] which contains 65 entries, including, arsenic, carbon tetrachloride, and mercury, as well as groups of pollutants, such as halomethanes.[17] Nonconventional pollutants are any pollutants not designated as a conventional or toxic pollutant; for example, EPA has developed limitations for such nonconventional pollutants as chemical oxygen demand,[18] total organic carbon, and the nutrients nitrogen and phosphorus.

The act authorizes EPA to establish effluent limits for these three pollutant categories according to several standards; the standards generally reflect increasing levels of treatment technologies. A treatment technology is any process or mechanism that helps remove pollutants from wastewater and can include filters or other separators, biological or bacteria-based removal, and chemical neutralization. Legislative history of the Clean Water Act describes the expectation of attaining higher levels of treatment through research and development of new production processes, modifications, replacement of obsolete plans and processes, and other improvements in technology, taking into account the cost of treatment.[19] Under the act, the effluent limits do not specify a particular technology to be used but instead set a performance level based on one or more particular existing treatment technologies. Individual facilities then have to meet the performance level set but can choose which technology they use to meet it.

[16]See Clean Water Act §307(a)(1), codified at 33 U.S.C. §1317(a)(1) (2011); see also 33 U.S.C. § 1362(13) (defining toxic pollutant). The list appears in the *Code of Federal Regulations* at 40 C.F.R. § 401.15. The committee report list was developed from a 1976 consent decree signed with the Natural Resources Defense Council, an environmental group, to resolve litigation that, among other things, sought to compel EPA to expand the list of toxic pollutants promulgated under the act. The consent decree was entered in NRDC et al. v. Train, 6 ELR 20588, (D.D.C. 1976). The statute authorizes EPA to revise the list.

[17]Human-made halomethanes are most notably used as refrigerants, solvents, propellants, and fumigants.

[18]Chemical oxygen demand is a measure of the oxygen-consuming capacity of inorganic and organic matter present in wastewater.

[19]See, e.g., *Senate Consideration of the Report of the Conference Committee*, October 4, 1972 (Statement of Sen. Muskie), reprinted in Cong. Research Serv., *A Legislative History of the Water Pollution Control Act Amendments of 1972*, at 169-70 (1978); S. Comm. on Public Works, *Water Pollution Control Act Amendments of 1972*, S. Rep. No. 92-414, at 50-51 (1971), reprinted in Cong. Research Serv., *A Legislative History of the Water Pollution Control Act Amendments of 1972*, at 7669-70 (1978).

Under the act, EPA was to issue initial guidelines for existing facilities on the basis of the "best practicable control technology currently available" for conventional, toxic, and nonconventional pollutants—guidelines to be achieved by 1977—followed by guidelines set on the basis of "best available technology economically achievable" for toxic and nonconventional pollutants and "best conventional pollutant control technology" for conventional pollutants. The act also called for guidelines known as "new source performance standards," which would apply to new facilities starting operations after such standards were proposed. When permitting authorities develop a permit, they apply standards most appropriate to a given facility: For example, a new facility would receive a permit with limits reflecting the new source performance standards. Existing facilities would generally receive permits with limits reflecting the best conventional technology and best available technology, but where those standards have not been issued, permit limits would reflect best practical treatment. Table 2 shows the different levels of treatment established in the act and the category of pollutant to which they apply.

Table 2: Standards for Effluent Guidelines for Direct Dischargers

Standard	Pollutants	Basis for treatment level	Entities subject to regulation
Best practicable technology currently available	Toxics, nonconventional, and conventional	The *average* of the best performances of facilities within the industry	Existing industrial facilities during the Clean Water Act's initial implementation phase (1977-89)
Best conventional pollutant control technology	Conventional	The *most stringent* technology option that passes tests as feasible and economically achievable	Existing industrial facilities, after 1989[a]
Best available technology economically achievable	Toxics and nonconventional	Level to be set with reference to the *best performer* in any industrial category and determined to be economically achievable for the category or subcategory	Existing industrial facilities, after 1989[b]
New source performance standards	Toxics, nonconventional, and conventional	The *most stringent controls attainable* through the application of the best demonstrated control technology that does not pose a barrier to entry	New industrial facilities

Source: GAO analysis.

[a]If EPA has not established an applicable best conventional technology effluent guideline, then the best practicable treatment effluent guideline still applies.

[b]If EPA has not established an applicable best available technology effluent guideline, then the best practicable treatment effluent guideline still applies.

The Clean Water Act requires EPA to annually review all existing effluent guidelines and revise them if appropriate, and also to review existing effluent limitations at least every 5 years and revise them if appropriate.[20] The Water Quality Act of 1987 added two related requirements to EPA's reviews. First, EPA is to identify, every 2 years, potential candidates for new effluent guidelines, namely, industries that are discharging significant, or nontrivial, amounts of toxic or nonconventional pollutants that are not currently subject to effluent guidelines. Second, every 2 years beginning in 1988, EPA is required to publish a plan establishing a schedule for the annual review and revision of the effluent guidelines it has previously promulgated. In response to these two requirements, EPA published its first effluent guidelines program plan in 1990, which contained schedules for developing new and revised effluent guidelines for several industrial categories.

From the start of the effluent guidelines program in the early 1970s, EPA has faced considerable litigation, with industry challenging most of the industry-specific effluent guidelines. As the agency implemented the program, EPA also faced challenges from environmental groups over its failure to issue guidelines and the process EPA used to screen and review industrial categories. For example, the Natural Resources Defense Council, an environmental organization, brought two suits, each seeking to compel EPA to meet its duties to promulgate effluent limitations for listed toxic pollutants, among other actions. As a result, EPA operated under two key consent decrees establishing court-approved schedules for it to develop and issue effluent guidelines regulations. In addition, under one of the consent decrees, EPA established a task force that operated from 1992 through 2000 and advised the agency on various aspects of the effluent guidelines program. In particular, the task force issued several reports advising EPA on changes to its screening and review process for the effluent guidelines program and recommended that EPA hold a workshop to discuss improvements to the process.

In 2002, after considering the recommendations made by both the task force and the workshop, EPA developed an approach to guide its post-consent decree screening and review, issued in a document called *A Strategy for National Clean Water Industrial Regulations*. Under this draft

[20]EPA is required to issue both effluent guidelines and effluent limitations. The agency issues regulations that simultaneously address both of these and therefore it does not distinguish between the reviews required for the guidelines and for the limitations.

strategy, EPA was to evaluate readily available data and stakeholder input to create an initial list of categories warranting further examination for potential effluent guidelines. The strategy identified the following four key factors for EPA to consider in deciding whether to revise existing effluent guidelines or to develop new ones:

- the extent to which pollutants remaining in an industrial category's discharge pose a substantial risk to human health or the environment;
- the availability of a treatment technology, process change, or pollution prevention alternative that can effectively reduce the pollutants and risk;
- the cost, performance, and affordability of the technology, process change, or pollution prevention measures relative to their benefits; and
- the extent to which existing effluent guidelines could be revised, for example, to eliminate inefficiencies or impediments to technological innovation or to promote innovative approaches.

The draft strategy also indicated that EPA would apply nearly identical factors to help determine whether it should issue effluent guidelines for industrial categories for which it had not yet done so. The document noted that EPA intended to revise and issue the strategy in early 2003, but EPA has chosen not to finalize it.[21] EPA officials stated that the agency made this choice because its implementation of the process was likely to evolve over time.

Since EPA issued its draft strategy, the agency has faced litigation challenging the use of technology in its screening process. In 2004, EPA was sued by Our Children's Earth, a nonprofit environmental organization, which alleged that EPA failed to consider technology-based factors during its annual review of industrial categories. On appeal, the Ninth Circuit Court decided in 2008 that the statute did not establish a mandatory duty for EPA to consider such factors. The court found that the

[21]See also 68 Fed. Reg. 75,515, 75,519 (Dec. 31, 2003) in which EPA stated, "EPA articulated an early form of this evolving analytical framework in the draft *Strategy for National Clean Water Industrial Regulations* ('draft Strategy'), which EPA hope[d] to finalize concurrently with the Effluent Guidelines Program Plan in 2004."

statute's use of the phrase "if appropriate" indicated that decisions on whether to revise guidelines are discretionary but are also constrained by the statute's mandate as to what effluent guidelines regulations are to accomplish.[22] Further, the court stated that the overall structure of the Clean Water Act strongly suggests that any review to determine whether revision of effluent guidelines is appropriate should contemplate technology-based factors.

EPA's Two-Phase Screening and Review Process Has Identified Few Industrial Categories for New or Revised Effluent Guidelines

EPA uses a two-phase process to review industrial categories potentially in need of new or revised effluent guidelines; from 2003 through 2010, the agency identified few such categories. Since 2003, EPA has annually screened all industrial categories subject to effluent guidelines, as well as other industrial categories that could be subject to new guidelines; it has identified 12 categories for further review and selected 3 categories to update or to receive new effluent guidelines.

EPA's Screening Phase Results in a Subset of Industrial Categories for Further Review

EPA's screening phase starts with a review of industrial categories already subject to effluent guidelines—as well as industrial categories that are not—to identify and rank those whose pollutant discharges pose a substantial hazard to human health and the environment.[23] EPA analyzes and ranks industrial categories using pollutant data from facilities in similar industrial classifications. Before it ranks industrial categories in this screening phase, EPA excludes from consideration any industrial categories where guidelines are already undergoing revision or have been revised or developed in the previous 7 years. For example, EPA

[22]Our Children's Earth (OCE) Found. v. EPA, 527 F.3d 842, 851 (9th Cir. 2008), rehearing 506 F.3d 781 (9th Cir. 2007), on appeal from 2005 U.S. Dist. Lexis 45716 (N.D. Cal. 2005).

[23]EPA's draft 2002 strategy stated that it would consider the risks to human health or the environment. According to a senior effluent guidelines program official, however, the agency's screening process includes a relative hazard assessment rather than a risk assessment. According to EPA, once an industrial category has been identified as posing a significant hazard on the basis of the screening analysis—and before initiating an effluent guideline rule making—the agency may then conduct a study of the industrial category to determine the risks imposed on human health and the environment.

Steam Electric Power-Generating Industrial Category

The steam electricity power-generating industrial category produces electric power by means of steam generated from fossil fuels (coal, oil, and natural gas) or nuclear fuels. In the process, a given power plant may discharge pollutants such as arsenic and mercury into water bodies. Pollutants from this category persist in the environment and can accumulate in aquatic organisms, wildlife, and humans, with long-term health effects. Effluent guidelines for this industry were first promulgated in 1974 and revised less than a decade later, in 1982.

Source: EPA documentation.

announced in its 2010 final effluent guideline program plan that it excluded the steam electric power-generating category from the screening phase because the agency had already begun revising effluent guidelines for this industry.[24] Also in 2010 EPA excluded the concentrated aquatic animal production category (e.g., fish farming) from screening because the agency issued effluent guidelines in 2004.

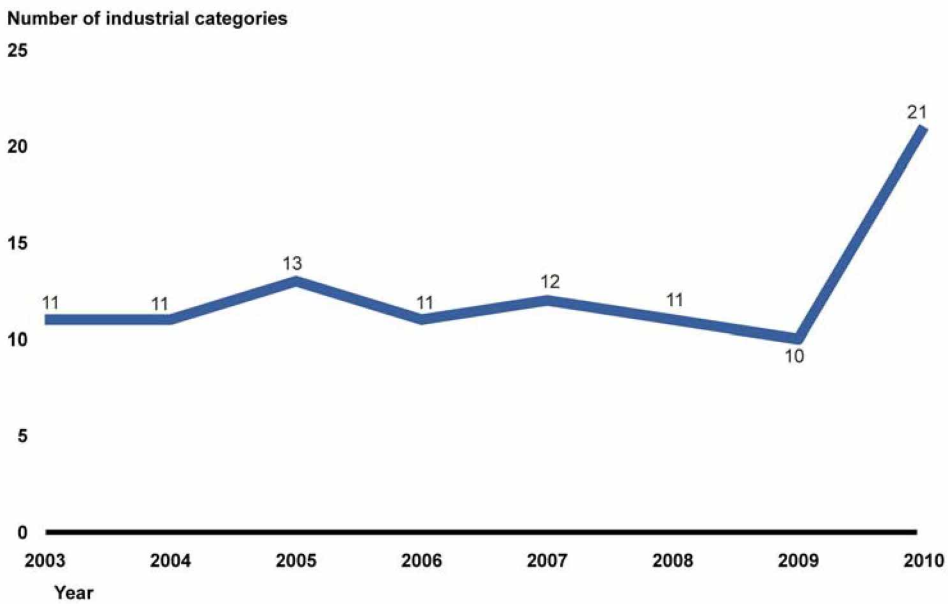
In ranking industrial categories during the screening phase, EPA considers the extent to which discharged pollutants threaten human health and the environment—the first factor identified in EPA's 2002 draft strategy. EPA compiles information from two EPA sources on the facilities within these industrial categories that discharge wastewater, the pollutants they discharge, and the amount of their discharge: (1) the discharge monitoring report database and (2) the Toxics Release Inventory.[25] From these two sources, EPA estimates the amount and relative toxicity of pollutant discharges from screened industrial categories, converts these estimates into a single "score" of relative toxicity for each industrial category, and uses this score to rank the industrial categories according to the reported hazard they pose. To determine the relative toxicity of a given pollutant, EPA multiplies the amount (in pounds) of that pollutant by a pollutant-specific weighting factor to derive a "toxic weighted pound equivalent." EPA's ranking of one industrial category relative to other categories can vary depending on the amount of the pollutants it discharges or the toxicity of those pollutants. For example, an industrial category, such as pesticide chemicals, may discharge fewer pounds of pollutants than another category, such as canned and preserved seafood processing, but have a higher hazard ranking because of the relative toxicity of the pollutant chemicals it discharges.

[24]The steam electric power-generating industry produces electric power by means of steam generated from fossil fuels, such as coal, oil, and natural gas, or nuclear fuels.

[25]As explained above, an industrial direct discharger is required to have an NPDES permit regardless of whether there are effluent guidelines for the industry. NPDES permits require monitoring for specific pollutants to determine compliance with permit limits. Some industries may also be subject to requirements under another EPA program to report toxic releases to the Toxics Release Inventory. These requirements are independent of whether an industry is regulated by effluent guidelines.

After ranking industrial categories, EPA identifies those responsible for the top 95 percent of the total reported hazard, which is the total of all industrial categories' hazard scores. EPA assigns these industrial categories a high priority for further review in the second phase of its review process. As the relative amounts of their discharges change, the number of industrial categories making up this 95 percent can vary each year with each screening EPA performs. From 2003 through 2009, for example, 10 to 13 industrial categories composed the top 95 percent of reported hazard, whereas in 2010, 21 categories made up the top 95 percent.[26] Figure 2 shows the number of industrial categories that EPA considered for possible further review on the basis of its hazard screening.

Figure 2: Industrial Categories Responsible for 95 Percent of the Total Reported Hazard and Considered for Possible Further Review, 2003-2010



Source: GAO analysis of EPA documents.

[26]According to EPA, the doubling in the number of industrial categories in 2010 resulted from the removal of the steam electric power-generating category from the ranking process after EPA decided to revise its effluent guidelines. Previously, that industrial category alone constituted up to 73 percent of the total toxic weighted pound equivalent. When EPA removed that category from its hazard ranking, many other industries with smaller hazard ranking scores moved into the top 95 percent.

Note: According to EPA, the doubling in the number of industrial categories in 2010 resulted from the removal of the steam electric power-generating category from the ranking process after EPA decided to revise its effluent guidelines. Previously, that industrial category alone constituted up to 73 percent of the total toxic weighted pound equivalent. When EPA removed that category from its hazard ranking, many other industries with smaller hazard ranking scores moved into the top 95 percent.

After it identifies the industrial categories contributing to 95 percent of reported hazard, EPA takes additional steps to exclude industrial categories before beginning the further review phase. Specifically, the agency may exclude industrial categories on the basis of three criteria:

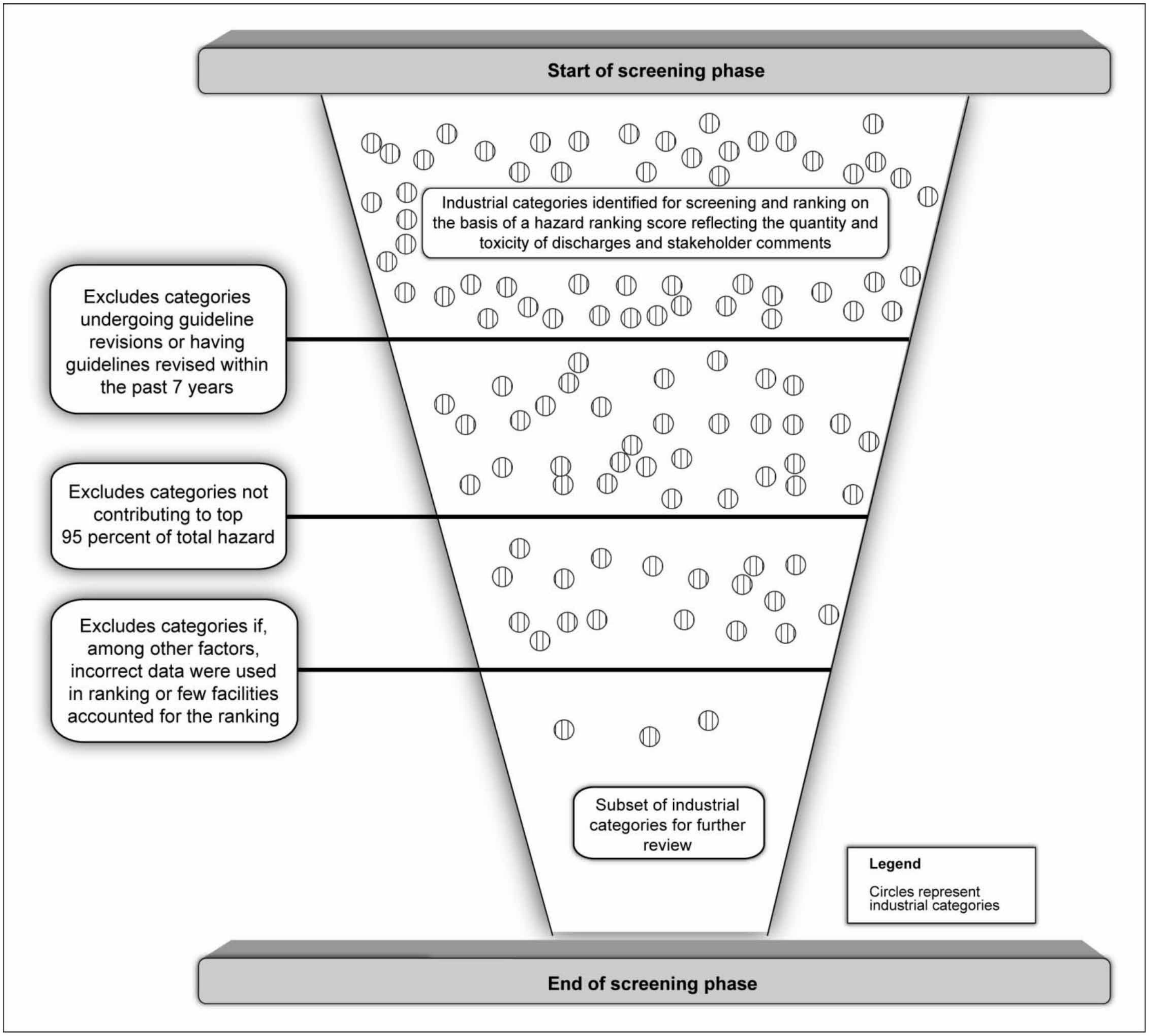
- *Data used in the ranking process contained errors*. After completing its ranking, EPA verifies the pollutant discharge data from the discharge monitoring reports and Toxics Release Inventory and corrects any errors. For example, according to EPA, the agency has found that facilities have reported the wrong unit of measurement in their discharge monitoring reports, or states have transferred data into the EPA database incorrectly. In such cases, a pollutant discharge may, for example, be reported at a concentration of 10 milligrams per liter but in fact be present at a concentration of 10 micrograms per liter—a thousand-fold lower discharge.

- *Very few facilities account for the relative toxicity of an industrial category*. EPA typically does not consider for further review industries where only a few facilities account for the vast majority of pollutant discharges and the discharges are not representative of the category as a whole. In such cases, EPA states in its effluent guideline program plans that revising individual NPDES permits may be more effective than a nationwide regulation to address the discharge. For example, in 2004, EPA determined that one facility was responsible for the vast majority of discharges of dioxin associated with the inorganic chemicals industrial category. In its effluent guideline program plan for that year, EPA indicated that it would work through the facility's NPDES permit to reduce these discharges as appropriate.

- *Other factors.* EPA considers other factors in addition to those described above to determine if an industrial category warrants further review. According to EPA, one such factor is inadequate data from which to make a clear determination. For example, in its 2010 screening phase, EPA excluded several industrial categories from the further review phase because it did not have conclusive data but said that it would “continue to review” the categories’ discharges to determine if they were properly controlled. These industries included pulp, paper, and paperboard; plastic molding and forming; and waste combustors.

Figure 3 illustrates the exclusion process EPA applies in its initial screening phase.

Figure 3: Criteria Used by EPA during Screening Phase to Exclude Industrial Categories from Further Review



Source: GAO analysis of EPA's screening process.

During the screening phase, EPA uses existing industry classifications as the basis for identifying industrial categories. EPA groups these industry classifications, which are identified by one of two standardized coding schemes, into industrial categories that it then considers for effluent guidelines.[27] If EPA identifies an industrial category that does not have effluent guidelines but has discharges that present a potential hazard, it decides whether the category produces a product or performs a service similar to one subject to existing effluent guidelines. If so, EPA generally considers the former category to be a subcategory of the latter. Conversely, if the products or services differ from categories subject to existing guidelines, EPA considers the category as a potential new category. In either case, EPA may decide that the industrial category warrants further review and, possibly, new effluent guidelines.

Throughout the screening phase, EPA also obtains stakeholder and public input, which may identify industrial categories warranting new or revised effluent guidelines that were not identified by their hazard ranking. Stakeholder and public input comes from EPA's solicitation of comments on its biennial preliminary and final effluent guidelines program plans. For example, in 2004 stakeholders raised concerns about discharges from dental facilities of mercury used in dental fillings; in response, EPA later identified the dental category for further review. On completing the screening phase, the agency lists in its preliminary or final effluent guidelines program plans the industrial categories it has identified for further review. Alternatively, EPA may decide on the basis of its screening criteria that no industrial categories warrant further review.

EPA's Further Review Phase Results in Few Industrial Categories to Consider for Potential New or Revised Effluent Guidelines

In its further review phase, EPA conducts detailed studies of any industrial categories identified in its screening phase, using the four factors listed in its November 2002 draft strategy to determine whether the categories need new or revised effluent guidelines. Since issuing its draft strategy, EPA has selected 12 industrial categories to move beyond the screening phase to the further review phase. Seven of the categories—for example, the pulp, paper, and paperboard category and the petroleum refining category—were identified for further review on the

[27]The industrial coding schemes that EPA uses are the Department of Labor's Standard Industrial Classification codes, created in the 1930s and the North American Industry Classification System, which was created through a cooperative effort of Canadian and Mexican government agencies and the U.S. Office of Management and Budget.

Airport Deicing Industrial Category

EPA's effluent guidelines for the airport deicing industrial category are the agency's most recent. They apply to the fluids airports use to deice airfield pavement. Discharges from deicing operations may lead to fish kills and reduced species diversity, contaminate drinking water sources (both surface and groundwater), and create noxious odors and discolored water. Airports with 1,000 or more annual jet departures must either control their discharge of ammonia or use non-urea-based airfield pavement deicing fluids. EPA first studied the airport deicing industrial category in the late 1990s to meet the terms of a consent decree. EPA named the category for rule making in 2004, and the agency finalized its regulations in May 2012.

Source: EPA documentation.

basis of the risk or toxicity of the pollutants they discharge, and 5 were identified for review on the basis of stakeholder concerns. If the categories are already subject to effluent guidelines that EPA set, the agency studies the need to revise effluent limits in the existing guidelines; if the categories are not subject to existing guidelines, EPA studies the need to develop effluent limits and apply them for the first time. Of the 12 categories selected for further review, 8 were already subject to existing effluent guidelines, and 4 were not.

During its further review phase, according to EPA documents, EPA gathers and analyzes more information on the factors identified in its draft strategy. During this phase, EPA typically analyzes information on the hazards posed by discharged pollutants, which corresponds to the first factor in its draft strategy. The data on hazards that EPA obtains and analyzes include: (1) characteristics of wastewater and of facilities; (2) the pollutants responsible for the industrial category's relative toxicity ranking; (3) geographic distribution of facilities in the industry; (4) trends in discharges within the industry, and (5) any relevant economic factors related to the industry.

During the further review phase, EPA also begins to gather and analyze information on the availability of pollution prevention and treatment technology for the industrial categories reviewed, which corresponds to the second factor identified in its draft 2002 strategy. Through this analysis, EPA identifies current technologies that industry is using to reduce pollutants, potential new technologies that could be used to reduce pollutants, or both. Table 3 summarizes EPA's consideration of treatment technologies for the 12 industrial categories that proceeded to the further review phase. For example, EPA studied one technology used by the ore mining and dressing industrial category and several current technologies for the coalbed methane category.

Table 3: Consideration of Treatment Technology during Further Review and Resulting Key Agency Decisions

Industrial category	Period for further review[a]	Consideration of treatment technology during further review	Key agency decisions after further review
Categories with existing effluent guidelines			
Chlorine and chlorinated hydrocarbons manufacturing[b]	2005-present	EPA did not prepare a written study for this industrial category. Instead it used site visits and sampled wastewater to collect data on pollutant quantities and conducted site visits to design an industry-led voluntary sampling plan. EPA officials stated that through implementation of the sampling plan, the agency discovered that most participating facilities used treatment technology that was effectively controlling their pollutant discharges.	According to EPA officials, the agency does not plan to initiate rule making for this industrial category because only one facility is responsible for the majority of the pollutant discharge.
Coalbed methane extraction[c]	2005-2010	In its 2010 study, EPA presented an overview of seven treatment methods used by this industry, depending on the type of wastewater pollutant produced during the extraction process.	On the basis of the study's findings, EPA in 2010 announced the start of rule making for effluent guidelines for this category. The agency plans to propose the rule in 2013.
Coal mining	2006-2008	In its 2008 study, EPA described two treatment technologies associated with the most common pollutant discharges resulting from coal mining processes.	On the basis of the study's findings, EPA decided to take no further action on this category, stating that the existing guidelines were appropriate to address the industry's discharges.
Ore mining and dressing	2008-2011	EPA prepared a study published in 2011, which included a review of one currently used treatment technology: high density sludge recycling. The review included an overview of this treatment, where it was used in the United States, and permit requirements for facilities that used the technology.	EPA in 2011 decided to take no further action on ore mining and dressing. The agency found that a small number of facilities were responsible for the majority of discharges and decided to address the pollutants the NPDES permit process with permitting or through compliance and enforcement activities.
Organic chemicals, plastics, and synthetic fibers	2003-2004	EPA's study of this category included general descriptions of treatments currently used by the industry, as well as a more detailed discussion of pollution prevention and wastewater treatment technologies used to minimize the amount of dioxin in wastewater streams.	EPA in 2004 decided to take no further action for the category because of the small number of facilities discharging significant amounts of toxic pollutants.

Industrial category	Period for further review[a]	Consideration of treatment technology during further review	Key agency decisions after further review
Petroleum refining	2003-2004	In its study of the petroleum refining category, EPA presented general information on current treatments used by refineries to treat wastewater produced and on additional pollution control alternatives.	EPA in 2004 decided to take no further action on petroleum refining because it found that most petroleum refining facilities were not discharging toxic pollutants. For the few facilities that were, the agency said it would seek changes through the NPDES permit process.
Pulp, paper, and paperboard	2005-2006	In its 2006 study, EPA identified technologies used in a laboratory setting, pilot programs, and industry to remove metals in wastewater from pulp and paper mills.	On the basis of findings from the further review phase, including that some available technologies were site-specific and not readily adaptable industrywide, EPA in 2006 decided to take no further action on this category,
Steam electric power generating	2005–2009	As part of its 2009 study, EPA focused primarily on technologies associated with two sources (coal-ash-handling operations and wastewater produced from specific air pollution control systems) because these sources account for a significant amount of the pollutants discharged by the industry.	On the basis of findings from its study, EPA in 2009 decided to begin revising the effluent guidelines for this category. Proposed revisions to existing guidelines are expected in November 2012, with final action expected by April 2014.
New industrial categories considered			
Dental facilities	2006-2008	EPA issued a study of dental facilities in 2008. The study discussed best management practices for dental facilities to reduce their discharge of dental amalgam containing mercury. In particular, the study reviewed facilities' continuing use of amalgam separators.	EPA In 2008 announced that it would not pursue a rule making and would instead work with stakeholders, including the American Dental Association and state water agencies, on a voluntary discharge reduction program. In 2010, however, the agency reversed its decision after assessing the progress made under the voluntary reduction program. EPA expects to propose effluent guidelines in 2012.
Drinking water treatment	2004-2011	EPA reviewed available treatment technologies as part of a 2011 study of the industry. Because drinking water treatment operations vary—in types of contaminants found at different plants, for example—the study presented a range of treatment approaches.	EPA took no further action on this category because the agency found that discharges from the category could best be addressed by adding limits to specific NPDES permits. In addition, according to agency officials, the 2011 technical report can provide information on technologies for state permit writers for drinking water treatment facilities.

Industrial category	Period for further review[a]	Consideration of treatment technology during further review	Key agency decisions after further review
Pharmaceuticals management[d]	2006-present	According to EPA officials, a study of the industrial category is still under way. Officials said that because of the nature of the industry, they are pursuing a "front-end" strategy to prevent flushing of unused pharmaceuticals into wastewater systems. Given this approach, treatment technologies will not be a primary focus of the agency's further review process.	EPA continues to work on its study, although according to agency officials, no further action is expected toward developing new effluent guidelines for this industry. Instead, the agency plans to update draft guidance issued in August 2010 on best management practices for unused pharmaceuticals at health care facilities.
Tobacco products processing	2004-2006	In 2006, EPA issued a study on this industry, which provided an overview of the treatment process typically used by tobacco products facilities.	The agency found that the category comprises primarily indirect dischargers; that pollutant loads are low; and, according to EPA officials, wastewater treatment plants remove 96 percent of the loads. EPA in 2006 therefore decided to take no further action.

Source: GAO analysis of EPA documents.

[a]The dates of further review (1) start with the year when EPA announced in an effluent guidelines program plan that it would conduct a study and (2) end with the year when EPA completed that work.

[b]Chlorine and chlorinated hydrocarbons manufacturing is a subcategory of two existing effluent guidelines categories: (1) organic chemicals, plastics, and synthetic fibers and (2) inorganic chemicals.

[c]Coalbed methane extraction is not covered by an existing effluent guidelines category, although EPA considers the industry a new subcategory of the oil and gas extraction category
.
[d]Pharmaceuticals management is not to be confused with pharmaceutical manufacturing.

During its further review phase, EPA also obtains and analyzes information related to the cost, affordability, and performance of technologies, the third factor in its strategy. To do so, EPA examines the cost and performance of applicable technologies, changes in production processes, or prevention alternatives that may reduce pollutants in the industrial category's discharge. As part of its cost analysis, the agency considers the affordability or economic achievability of any identified technologies, production processes, or prevention alternatives. To assess the performance of technologies, EPA considers the results of the treatment technologies used in tests or actual operations—information the agency obtains from published research papers and internal and external

Coalbed Methane Extraction Industrial Category

Coalbed methane extraction requires the removal of groundwater to facilitate the flow of natural gas to the surface, unlike extraction of conventional natural gas. The industrial category is currently unregulated. Through a nationwide survey, EPA determined that the 750 coalbed methane extraction projects across the country use 56,000 individual wells. Total dissolved solids in the discharge from coalbed methane extraction wells are EPA's chief pollutant of concern. The photograph shows a tanker truck loading groundwater collected during methane extraction. According to agency documents, EPA plans to propose an effluent guideline for this portion of the oil and gas extraction industrial category in 2013.

Source: EPA documentation.

sources, including site visits and surveys of industrial facilities.[28] During its further review of the steam electricity power-generating industry, for example, EPA sampled wastewater directly at power plants, surveyed plant operators about which technologies they were using to minimize pollutant discharges and at what cost, and sought information on other potential treatment technologies.

At the conclusion of its further review of an industrial category, EPA decides whether it is feasible and appropriate to revise or develop effluent guidelines for the category, a decision that includes gathering information on whether an effluent guideline is the most efficient and effective approach to manage the discharges, the fourth factor in EPA's draft strategy. As shown in table 3, for example, EPA decided that the drinking water treatment industrial category did not require effluent guidelines but that the agency's study could act as a resource for state permit writers as they issue permits for drinking water facilities. Or, as also shown in table 3 for coalbed methane, EPA decided to develop guidelines that it plans to propose in 2013. Some of the information EPA can consider during this decision making, and some of the information related to the fourth factor in its strategy, is the extent to which existing effluent guidelines could be revised to eliminate inefficiencies or impediments to technological innovation or to promote innovative approaches. Specifically, EPA considers whether another way exists—either regulatory or voluntary—to decrease pollutant discharges. For example, after the further review of the dental facility category in 2008, EPA decided not to develop effluent guidelines but to instead work with the American Dental Association and state water agencies on a voluntary reduction program to reduce pollutant discharges from dental facilities. It later changed its decision because the voluntary effort was shown to be ineffective, and the agency plans to issue effluent guidelines in 2012.

It takes EPA, on average, 3 to 4 years to complete the further review phase for an industrial category. As of July 2012, EPA had identified three industrial categories for which it had decided to revise effluent

[28]Under the Paperwork Reduction Act, EPA can contact—with a survey or questionnaire—up to 9 entities without first obtaining approval from the Office of Management and Budget. If EPA decides to contact 10 or more entities, the agency must prepare an Information Collection Request. This request describes the information to be collected, gives the reasons the information is needed, and estimates the time and cost for respondents to answer the request. The office reviews the request and determines if the request is approved or disapproved, or it defines conditions to be met for approval.

guidelines—steam electric power generating—or to develop new effluent guidelines—coalbed methane extraction and dental facilities.[29] According to agency documents and officials, EPA has chosen to take no action on the other 9 of the 12 categories it has further reviewed since 2002.

Focus on Limited Hazard Data to the Exclusion of Technology Information May Have Led EPA to Overlook Industrial Categories for Pollution Reduction

Limitations in the screening phase of EPA's review process may have caused the agency to overlook some industrial categories that warrant new or revised effluent guidelines and thus hinder the effectiveness of the effluent guidelines program in advancing the goals of the Clean Water Act. First, the data EPA uses in the screening phase has limitations that may cause the agency to omit industrial categories from further review or regulation. Second, EPA has chosen to focus its screening phase on the hazards associated with industrial categories, without considering the availability of treatment technologies or production changes that could reduce those hazards. The screening phase of the process may thus exclude some industrial categories for which treatment technologies or production changes may be available to serve as the basis for new or revised effluent guidelines.

Limitations in Hazard Data May Have Caused EPA to Overlook Industrial Categories

The two sources EPA relies on during its initial screening process—discharge monitoring reports and the Toxic Release Inventory—have limitations that may affect the agency's ability to accurately rank industrial categories for further review on the basis of the human health and environmental hazards associated with those categories. Data from industrial facilities' discharge monitoring reports have the benefit of being national in scope, according to EPA documents, but according to agency officials and some experts we spoke with, these data have several limitations that could lead the agency to underestimate the hazard caused by particular industries. Specifically:

- *The reports contain data only for those pollutants that facilities' permits require them to monitor.* Under NPDES, states and EPA

[29]EPA also announced in October 2011 the initiation of a new effluent guideline rulemaking process for shale gas extraction. The agency decided to undertake the rulemaking on the basis of stakeholder concerns about the industrial category without going through a further review phase. The agency plans to propose new standards in 2014. In addition, EPA conducted the further review phase of the airport deicing industrial category prior to our 2003 time frames. The agency issued effluent guidelines for the category in May 2012.

offices issue permits containing limits for pollutant discharges, but those permits may not include limits for all the pollutants that may be discharged, as for example, if those pollutants are not included in the relevant effluent guidelines or need not be limited for the facility to meet state water quality standards.[30] If a pollutant is not identified in a permit, and hence not reported on discharge monitoring reports, it would not be part of EPA's calculation of hazard and would not count toward the ranking of industrial categories.

- *The reports do not include data from all permitted facilities.* Specifically, EPA does not require the states to report monitoring results from direct dischargers classified as minor. According to EPA, the agency in 2010 analyzed data for approximately 15,000 minor facilities, or about 37 percent of the 40,500 minor facilities covered by NPDES permits. As a result, the pollutants discharged by the remaining 25,500 minor dischargers would not be counted as part of the relative toxicity rating and could contribute to undercounting of pollutants from those industrial categories. For example, most coal mining companies in Pennsylvania and West Virginia are considered minor dischargers whose pollutants would not count toward the ranking of that industrial category.
- *The reports include very limited data characterizing indirect discharges from industrial facilities to wastewater treatment plants,* according to EPA documents. Thus, the data do not fully document pollutants that, if not removed by a wastewater treatment plant, are discharged. These data are not incorporated into EPA's calculations of hazard for each industrial category, and thus result in underestimated hazards.[31]

[30]Generally, permits are to establish limitations for those pollutants reasonably expected to be present in wastewater with potential to cause or contribute to an excursion above a water quality standard. For an industry with an effluent guideline, the guideline specifies which pollutants must, at minimum, be included in the permit. For other industries, the permit writer uses information provided on the permit application, as well as other sources, to determine which pollutants may be present in wastewater and warrant a limitation. In addition, permits may include water-quality-based limits derived from the standards for the water body into which the effluent is discharged.

[31]In addition, EPA has identified some limitations in the discharge monitoring report data that may cause the agency to overestimate the hazard presented by an industrial category. For example, many facilities do not report average quantities for specific pollutants, in which case, EPA has to base its estimates on the maximum or other amount discharged, which could lead to overestimating a facility's actual discharges.

EPA documents and some experts we contacted also stated that data collected in the Toxics Release Inventory are useful to identify toxic discharges. Nevertheless, according to the agency and experts, these inventory data have limitations that may cause EPA to either overestimate or underestimate the relative toxicity of particular industrial categories. The limitations they identified include the following:

- *The data reported are sometimes estimates and not actual monitored data*. In some cases, the use of an estimate may overreport actual pollutant discharges. For example, some industry experts said that to be conservative and avoid possible liability, some facilities engaging in processes that produce particularly toxic pollutants, such as dioxin, may report the discharge of a small amount on the basis of an EPA-prescribed method for estimating such discharges even if the pollutant had not been actually monitored.

- *Not all facilities are required to report to the inventory*, which may lead to undercounting the discharges for the industrial categories of which the facilities are a part. Facilities with fewer than 10 employees are not required to report to the inventory, and neither are facilities that do not manufacture, import, process, or use more than a threshold amount of listed chemicals. For example, facilities that manufacture or process lead or dioxin do not need to report to the inventory unless the amount of chemical manufactured or processed reaches 10 pounds for lead or 0.1 grams for dioxin.

Despite the limitations of these data sources, EPA officials said that discharge monitoring reports and the Toxic Inventory Release are the best available data on a national level. Experts we interviewed also generally supported the continued use of these data sources despite their limitations. An EPA official responsible for the screening and review process said that EPA could not quantify the effect of the missing data on its ranking and setting of priorities for industries without time-consuming and expensive collecting of data directly from industrial facilities. Still, agency officials agreed that the data limitations can lead to under- or overestimating the hazard of discharges from industrial categories, which could in turn affect the rankings of these categories and potentially result in different categories advancing for further review and potential regulation.

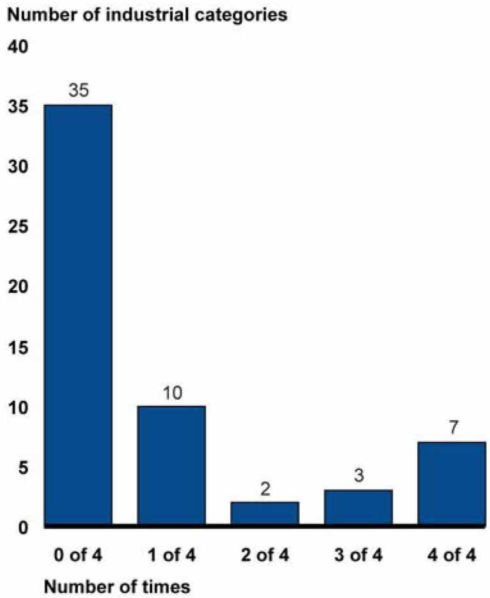
EPA's Screening Phase Does Not Consider Treatment Technologies, Omitting Some Industrial Categories from Further Review

EPA's primary focus during its screening phase is the relative hazard posed by industrial categories, without consideration of available treatment technologies that could be used as the basis for revised effluent guidelines to help reduce pollutant discharges. Because EPA sets the cutoff point in its screening process as industrial categories contributing to 95 percent of total reported hazard, the agency does not consider for further review the categories contributing to 5 percent of the total reported hazard. Although this percentage is low, the categories involved constitute the majority of all industrial categories with effluent guidelines. EPA does not conduct a further review for these and other industrial categories that it has excluded for other reasons, meaning that EPA does not examine them for the availability of more-effective treatment technologies. As previously noted, the Ninth Circuit Court held in 2008 that EPA does not have a mandatory duty to consider technology in its screening process but stated that the act strongly suggests that any review to determine whether revision of effluent guidelines is appropriate should contemplate technology-based factors. Regardless of whether EPA is required to do so, the agency is not considering technology for these industrial categories, and hence EPA cannot ensure that the facilities in these categories are using the best available treatment technology.

According to our analysis of EPA's planning documents for the effluent guidelines program, since the agency in 2003 began using its current screening process, more than half the industrial categories with effluent guidelines did not advance beyond the screening phase in any year from 2003 to 2010. The reason these categories did not advance was that, during a given 2-year screening cycle, the relative toxicity of their pollutant discharges did not put them among the top 95 percent of dischargers. As a result, these industrial categories were excluded from further review before EPA would have analyzed the availability of more-advanced treatment technologies or production processes. As figure 4 shows, from 2003 through 2010, out of the 57 industrial categories with existing effluent guidelines at the time of review, EPA excluded 35 in each of the four biennial screening cycles, thus omitting them from further review of the availability of treatment technologies or production

processes that could reduce hazards from discharges.[32] (See app. III for further information on the industrial categories that have and have not come within the top 95 percent since 2003.)

Figure 4: Number of Times Existing Industrial Categories Were in the Top 95 Percent of Total Reported Hazards in the Four Biennial Screening Phases from 2003 through 2010



Source: GAO analysis of EPA data.

Note: The total number of industrial categories with effluent guidelines during this period was 57.

As noted in 4 of the 17 interviews with experts we interviewed from academia, industry, nonprofit organizations, and state and local water quality agencies, consideration of treatment technologies is especially important for older effluent guidelines because either the industrial categories or the treatment technologies would have been more likely to change, making it possible that new, more advanced treatment technologies are available. As table 4 shows, however, effluent guidelines

[32]And, as we described above, after identifying the industrial categories contributing to the top 95 percent of hazard, EPA may use other factors to exclude additional industrial categories before beginning the further review phase. Therefore, even those categories within the top 95 percent do not necessarily receive the further review examining the availability of treatment technology.

have not been revised since the 1980s for 8 of the 35 industrial categories that have been excluded from further review. Further, 25 of the 35 effluent guidelines for categories that were excluded from further review have not been revised since 1995 or earlier. Battery manufacturing, for example, has not been through the further review phase since EPA began using its current screening and review process. Yet according to state officials we interviewed, the effluent guidelines for this category apply to older battery types and do not address wastewater from the manufacture of newer battery types, such as those made with lithium. In addition, even in cases where EPA has revised the effluent guideline for an industrial category, the revision may have addressed just a portion of the guideline. For example, EPA may add pollutants or change the limits for a particular industrial category or add a new subcategory. Thus, the guidelines for the category as a whole may not have been revised since the guidelines were originally promulgated. Table 4 shows the 35 industrial categories that were excluded from further review over the last 8 years, the year effluent guidelines were promulgated, and the year the categories' guidelines were most recently revised.

Table 4: Regulated Industrial Categories Excluded in the Screening Phase from Further Review, 2003-2010

Industrial category	Year promulgated	Year most recently revised	Number of years elapsed since most recent revision
Porcelain enameling	1982	1985	27
Electrical and electronic components	1983	1985	27
Electroplating	1981	1986	26
Copper forming	1983	1986	26
Metal finishing	1983	1986	26
Battery manufacturing	1984	1986	26
Aluminum forming	1983	1988	24
Nonferrous metals forming and metal powders	1985	1989	23
Asbestos manufacturing	1974	1995	17
Canned and preserved fruits and vegetables processing	1974	1995	17
Canned and preserved seafood processing	1974	1995	17
Dairy products processing	1974	1995	17

Industrial category	Year promulgated	Year most recently revised	Number of years elapsed since most recent revision
Ferroalloy manufacturing	1974	1995	17
Glass manufacturing	1974	1995	17
Grain mills	1974	1995	17
Soap and detergent manufacturing	1974	1995	17
Sugar processing	1974	1995	17
Ink formulating	1975	1995	17
Paint formulating	1975	1995	17
Paving and roofing materials (tars and asphalt)	1975	1995	17
Explosives manufacturing	1976	1995	17
Gum and wood chemicals	1976	1995	17
Hospital	1976	1995	17
Carbon black manufacturing	1978	1995	17
Leather tanning and finishing	1982	1996	16
Pharmaceutical manufacturing	1983	2003	9
Iron and steel manufacturing	1982	2005	7
Transportation equipment cleaning	2000	2005	7
Coil coating	1982	2007	5
Concentrated animal feeding operations	2003	2008	4
Photographic	1976	No revisions	No revisions
Metal products and machinery	2003	No revisions	No revisions
Concentrated aquatic animal production	2004	No revisions	No revisions
Meat and poultry products	2004	No revisions	No revisions
Construction and development	2009	No revisions	No revisions

Source: GAO analysis of EPA documentation.

Note: In a given year, EPA may have revised just a portion of the effluent guideline for an industrial category. For example, EPA may have added pollutants or changed the pollutant limits for a particular industrial category or added a new subcategory.

Our survey of state water quality directors, who are responsible for NPDES permits, also identified industrial categories that have been omitted from EPA's further review phase even when treatment technologies may be available. Specifically, state officials identified nine industrial categories that they think pose significant risk and have treatment technologies or pollution prevention practices available to mitigate that risk, categories for which the effluent guidelines should be

revised. Further, state officials generally thought that industries could implement the technologies without financial hardship. Nevertheless, EPA has excluded these industrial categories from further review because they did not contribute to the top 95 percent of total reported hazard. At least one state director identified one or more of the following nine industrial categories as needing revised effluent guidelines, noting that their pollutants were hazardous to human health or the environment and technologies were available to further reduce these hazards: canned and preserved seafood processing; dairy products processing; electrical and electronic components; electroplating; grain mills; meat and poultry products; metal finishing; pharmaceutical manufacturing; and sugar processing. With regard to metal finishing, for example, state officials said that existing guidelines reflect processes no longer in use and do not address newer and more common production techniques and associated pollutants. In contrast, state officials agreed with EPA's efforts to revise or develop new effluent guidelines for certain other industrial categories, including steam electric power generation and airport deicing. (For more information on our survey and its results, see appendix II.)

In its 2002 draft strategy, EPA recognized the importance of including treatment technology in its screening phase but later stated that it was unable to develop an approach it deemed feasible for gathering such information. The draft strategy included treatment technology as one of the factors that EPA would use to screen industrial categories to determine if they needed new or revised effluent guidelines. According to the draft strategy, EPA was to obtain information on available treatment technologies and pollution prevention practices by regularly reviewing trade publications; participating in professional conferences; and consulting with permit writers, industry representatives, and the public. EPA initially pursued this approach, but in 2003 concluded that gathering the data needed to perform a meaningful screening-level analysis for technology was much more resource intensive than anticipated[33] and restricted the screening phase to comparing the degree of hazard posed by various industrial categories.[34] Yet without treatment technology data,

[33]68 Fed. Reg. 75515, 75521 (Dec. 31, 2003) ("EPA found that it was much more difficult than anticipated to gather the data needed to perform a meaningful screening-level analysis of the availability of treatment or process technologies that might reduce hazard or risk beyond the performance of technologies in place.").

[34]Environmental Protection Agency, *Factor 2 Analysis: Technology Advances and Process Changes* (Washington, D. C.: December 2003).

the agency cannot be confident that the effluent guidelines program is meeting the Clean Water Act's goal of applying the best available technologies economically achievable or that the program reflects advances in the technologies used to reduce pollutants in wastewater.

EPA Is Adding Hazard Data Sources but Is Not Fully Using Potential Sources of Information on Treatment Technologies

EPA has begun to take actions to improve the hazard data it uses in its screening of industrial categories, but it is not fully using potential sources of information on treatment technologies for consideration in this screening. According to program officials, EPA has recognized that its screening phase has resulted in the same industries rising repeatedly to the top of its hazard rankings. Program officials said that they are considering changes to their screening approach to identify additional industrial categories for further review. The primary change, the officials told us, would be to rank categories according to toxicity every 2 years, rather than annually, and to supplement that ranking with a targeted analysis of additional sources of data. To develop such revisions, officials from EPA's effluent guidelines program engaged in an informal "brainstorming" exercise within the agency and identified several sources of data on new and emerging pollutants, sources that officials think could help target industrial categories for further review. EPA officials said they will propose revisions to the review process in the 2012 preliminary effluent guidelines program plan they expect to issue late in 2012.

To mitigate the limitations with hazard data that EPA currently experiences, the agency has taken several steps to obtain new sources of information and to improve existing sources. Using additional sources of data is consistent with suggestions made to us by several academic and governmental experts we interviewed that other sources of hazard data may be useful to the agency, including additional monitoring data and data on the quality of water bodies receiving wastewater discharges.[35] The new data sources would broaden the hazard data considered in the screening phase. Among the sources EPA intends to pursue for future use are the following:

- a 2009 EPA survey of sludge produced by wastewater treatment plants to identify pollutants entering these plants, indicating that they

[35]Notably, of the six experts we interviewed from industry, only one suggested additional sources.

are not being treated by an industrial facility and might need regulation;

- a review of action plans prepared under EPA's Office of Pollution Prevention and Toxic Substances for specific chemicals of emerging concern to identify pollutants that are likely to be discharged to waters by industrial point sources;
- a review of all EPA air pollution regulations issued within the last 10 to15 years to identify new treatment processes that could add to or change the pollutants in wastewater streams;[36] and
- a review of data and information available concerning industries that EPA is considering for a proposed expansion of required reporting for the Toxics Release Inventory.

EPA is also drafting a rule that would increase the information EPA receives electronically from discharge monitoring reports from NPDES permittees and permitting authorities. According to officials with the effluent guidelines program, increased electronic reporting would result in a more complete and accurate database and improve their access to the hazard data from facilities' discharge monitoring reports, thereby improving the screening of industrial categories. For example, according to EPA officials, data on minor facilities that are not currently reported into the discharge monitoring database used in the screening process would be reported under the electronic reporting rule, as sent to the Office of Management and Budget for review.[37]

EPA recognizes the need to use information on treatment technologies in the screening phase to improve its process and has taken some initial steps to develop a database of such information, but it has not made full use of potential data sources. EPA started to gather information on treatment technology in 2011, contracting with consultants to obtain

[36]Air pollution regulations can be relevant in that they may cause a shift in pollutants from air emissions to wastewater or sludge. For example, EPA's ongoing effort to revise the effluent guidelines for the steam electric power-generating industry is in part a response to changes in the industry's wastewater as the plants installed scrubber equipment that uses water to remove pollutants to comply with air pollution regulations to control sulfur dioxide.

[37]As of August 2012, the Office of Management and Budget is reviewing EPA's draft electronic reporting rule. Accordingly, EPA has not yet proposed the rule.

relevant literature for the database. In its comments on a draft of this report, the agency said that it will expand on this work in 2013 and 2014 once new fiscal year operating plans are in place. According to agency officials, a thorough analysis of the literature would give the program an updated technology database, which would help in identifying advances in technologies in use or with potential use in industrial categories, which, on the basis of these advances, may in turn warrant further review. They noted that in the 1980s and 1990s, the program used such information from an agency database but that the database had become outdated.

In more than half of our interviews (10 of 17), experts told us that EPA should consider technology in its screening phase,[38] and some of them suggested the following two approaches for obtaining this information:

- *Stakeholder outreach.* Experts suggested that key stakeholders could provide information on technology earlier in the screening process. Currently, EPA solicits views and information from stakeholders during public comment periods following issuance of preliminary and final effluent guidelines plans. According to experts, EPA could obtain up-to-date information and data from stakeholders beyond these formal comment periods. For example, EPA officials could (1) attend annual workshops and conferences hosted by industries and associations, such as engineering associations, or host their own expert panels to learn about new treatment technologies and (2) work with industrial research and development institutes to learn about efforts to reduce wastewater pollution through production changes or treatment technologies.

- *NPDES permits and related documentation.* Experts suggested that to find more information on treatment technologies available for specific pollutants, EPA could make better use of information in NPDES permit documentation. For example, when applying for NPDES permits, facilities must describe which pollutants they will be discharging and what treatment processes they will use to mitigate these discharges. Such information could help EPA officials administering the effluent guidelines program as they seek technologies to reduce pollutants in similar wastewater streams from similar industrial processes. Similarly, information from issued NPDES

[38]Five experts said that EPA should not consider technology earlier in its screening phase, and two did not provide their opinions.

permits containing the more stringent water quality-based limits—which may lead a facility to apply more advanced treatment technologies—could suggest the potential for improved reductions. Further, information in fact sheets prepared by the permitting authority could also furnish information on pollutants or technologies that could help EPA identify new technologies for use in effluent guidelines.

According to EPA officials, these two sources of information have not been extensively used. They said that they would like to obtain more stakeholder input during screening and review, but they have limited time, resources, and ability to work with stakeholders. They noted that the effluent guidelines program does assign staff members responsibility for keeping up with technologies and developments in specific industrial categories. They also said that the NPDES information suggested by experts is not current or readily available for use by the program.

Our analysis of NPDES information, however, showed that EPA has not taken steps to make the information available for use by the effluent guidelines program. For example, the standard list of treatment processes on the NPDES application form has not been updated since 1980, and EPA officials said it was out of date. Yet EPA has not updated this information or provided it to the effluent guidelines program for use in screening available technologies. EPA could have done so through a second rulemaking effort under way to improve NPDES data—in which EPA is updating NPDES application forms to make them more consistent with NPDES regulations and current program practices—but chose not to. Agency documents about this rulemaking described it as modifying or repealing reporting requirements that have become obsolete or outdated over the past 20 years and modifying permit documentation procedures to improve the quality and transparency of permit development. Nonetheless, effluent guidelines program officials said that they did not request potential NPDES permit updates relevant to their program because the scope of this rulemaking was too narrow. EPA's Office of Wastewater Management, which is responsible for the rulemaking, confirmed that the scope of the proposed rule is to be narrow and not call for states or permittees to provide new information.

Further, fact sheets or similar documentation that NPDES permit writers develop describing the basis for permit conditions are not stored in EPA's electronic NPDES database and are therefore difficult to obtain and analyze, according to program officials. Instead, these NPDES documents are now maintained by the authorized states or EPA regions and are not readily accessible to the effluent guidelines program.

Program officials said that electronic transmission of fact sheets or information about the basis for permit limits could be useful in identifying treatment technologies, although the scope of the electronic reporting rulemaking did not include such documents or information. Officials from the Office of Enforcement and Compliance Assurance, the office responsible for this rulemaking, told us that they discovered such wide variability among the states' practices for gathering and managing NPDES information like fact sheets or the basis for permit limits that it would be difficult to call for electronic reporting of such information.

Conclusions

EPA and the nation have made great strides in reducing the pollutants in wastewater discharged from point sources, such as industrial facilities, since the Clean Water Act was passed. EPA's effluent guidelines program has been key in contributing to these results by establishing national uniform limits on pollutant discharges for various industrial categories. Progress within the program has slowed, however, and numerous effluent guidelines for particular industrial categories have not been revised for 2 or 3 decades, although the act calls for EPA to routinely review its effluent guidelines and update or add to them as appropriate. EPA's approach for screening and further reviewing industrial categories, as currently implemented, has not identified many categories for the agency to consider for new or revised guidelines, and the screening process has identified many of the same industrial categories year after year. EPA's approach focuses its resources on the most hazardous sources of pollution, but its reliance on incomplete hazard data during the screening phase has limited the results of the approach, as has EPA's inability to thoroughly collect treatment technology data within its resource constraints. Under EPA's current approach, most industrial categories have not received a detailed further review examining the availability of more-effective treatment technologies. According to some experts, consideration of treatment technologies is especially important for older effluent guidelines because changes in either the industrial categories or the treatment technologies are more likely to have occurred, making it possible that new, more advanced and cost-effective treatment technologies have become available. EPA has recently taken steps to obtain more information on treatment technologies for use in its screening phase—which could help make up for limitations in the hazard data it currently uses—but it has not taken steps to improve and gain access to technology information from the NPDES program. Further, EPA is reconsidering its approach to its screening and review process—initially documented in its draft strategy that was never finalized—but has not analyzed a range of possible sources of data to

improve the program, including taking full advantage of the NPDES database, obtaining relevant stakeholder input, and reviewing older effluent guidelines for changes in either the industry or available treatment technologies. Without evaluating a range of new sources of relevant information, officials with the effluent guidelines program cannot ensure that the reconsidered approach can be implemented or that it optimizes the agency's ability to consider technology in the screening process. Most important, without a more thorough and integrated screening approach that both improves hazard information and considers treatment technology data, EPA cannot be certain that the effluent guidelines program is reflecting advances in the treatment technologies used to reduce pollutants in wastewater.

Recommendations for Executive Action

To improve the effectiveness of EPA's efforts to update or develop new effluent guidelines, we recommend that the Administrator of EPA direct the effluent guidelines program to take the following three actions, as it considers revisions to its screening and review process:

- Identify and evaluate additional sources of data on the hazards posed by the discharges from industrial categories.
- Identify and evaluate sources of information to improve the agency's assessment in the screening phase of treatment technologies that are in use or available for use by industrial categories, including better use of NPDES data.
- Modify the screening phase of its review process to include thorough consideration of information on the treatment technologies available to industrial categories.

Agency Comments and Our Evaluation

We provided a draft of this report to EPA for review and comment. In its written comments, which are reproduced in appendix IV, EPA said that our report adequately describes the agency's effluent guidelines program and agreed in principle with two of the report's recommendations but disagreed with the third recommendation. EPA also provided several technical comments, which we have incorporated as appropriate.

Regarding our first recommendation, that EPA identify and evaluate additional sources of data on the hazards posed by industrial discharges and factor these into its annual reviews, EPA agreed that additional sources of such data are valuable. For this reason, EPA said, it began

collecting new sources of hazard information in 2011, which the agency is using in its 2012 annual review. EPA also said that its preliminary 2012 effluent guideline program plan will solicit additional ideas for new hazard data sources from the public and industry stakeholders. We described EPA's ongoing and planned efforts in our report, but because the agency has not yet published its preliminary 2012 effluent guideline program plan, we cannot determine the extent to which these efforts address the limitations we identified in its hazard data. Likewise, we are not able at this time to confirm that EPA will solicit additional sources of such data from stakeholders. We support EPA's stated intent to identify and evaluate additional sources of hazard data and retain our recommendation, reinforcing the need for the agency to continue the efforts it has begun.

Regarding our second recommendation, that EPA should identify and evaluate additional sources of information to improve its assessment of treatment technologies for industrial dischargers, EPA agreed that treatment technology information is useful to its program. The agency added that, given the importance of new treatment technology information, in 2011 it initiated efforts to gather more treatment information across all industry categories and will be expanding on this work in 2013 and 2014, once new fiscal year operating plans are in place. We described EPA's initiative to obtain and review technical literature on treatment technology in our report. We nevertheless believe that EPA could use other sources of information on treatment technology, including information associated with NPDES permits, as described in the report. We continue to believe that EPA should identify and evaluate these and other sources of information on treatment technologies, with the goal of ensuring that the agency's effluent guidelines reflect the best available treatment technologies that are economically achievable.

Regarding our third recommendation, that EPA modify the screening phase of its review process to include a thorough consideration of information on the treatment technologies available to industrial categories, EPA agreed that factoring treatment technology information into its reviews is valuable. The agency said, however, that the recommendation was not workable in the context of the agency's current screening phase, noting that such an effort would be very resource intensive. Our concern is that EPA's current screening phase, while targeted toward high-risk industries, does not ensure that effluent guidelines incorporate the best available treatment technologies that are economically achievable. We acknowledge that evaluating technologies for all existing industrial categories could be difficult for EPA to

accomplish on an annual basis under its current approach. Our recommendation, however, did not specify that such an evaluation be done every year. For example, EPA could commit to a detailed study of the technologies in use and available to an industrial category on a periodic basis (i.e., every 5-10 years). As noted in our report, EPA's 2002 draft strategy recognized the importance of evaluating treatment technologies in its screening phase, and the Court of Appeals for the Ninth Circuit held that, while not mandatory, the Clean Water Act strongly suggests that in determining whether the revision of effluent guidelines is appropriate—which begins with the screening phase—the agency should contemplate technology-based factors. However, we are not aware of any detailed EPA evaluation of options for considering technology during the screening phase since the agency announced in 2003 that performing a meaningful screening-level analysis of the availability of treatment technologies as planned in the draft strategy was "much more difficult than anticipated." We believe that, nearly a decade later, EPA should, within the constraints of available resources, evaluate current options to consider such technologies in its screening phase. Furthermore, given its efforts to develop and update its technology information, we believe that EPA should clarify how it plans to incorporate this information in its screening phase.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to the Administrator of EPA, the appropriate congressional committees, and other interested parties. In addition, the report will be available at no charge on the GAO website at http://www.gao.gov.

If you or your staff members have any questions about this report, please contact me at (202) 512-3841 or trimbled@gao.gov. Contact points for our Office of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix V.

Sincerely yours,

David C. Trimble
Director, Natural Resources and Environment

Appendix I: Scope and Methodology

To examine the process the Environmental Protection Agency (EPA) follows to screen and review industrial categories and the results of that process, we reviewed the Clean Water Act and relevant court decisions and agency documents, interviewed agency officials and experts, and documented the steps EPA has taken to screen particular industrial categories for possible new or revised effluent guidelines. Specifically, we reviewed relevant portions of the Clean Water Act to determine EPA's responsibilities regarding the effluent guidelines and pretreatment programs. We analyzed several court decisions that ruled on challenges to EPA's effluent guidelines program to determine what, if any, impact they had on the agency's screening and review process. Further, we interviewed officials in EPA's Engineering and Analysis Division to learn how the agency has used the process to screen and review industries. We focused our review on the results of the process EPA used from 2003 through 2010 in order to examine the approach it developed after the publication in November 2002 of its draft *Strategy for National Clean Water Industrial Regulations: Effluent Limitation Guidelines, Pretreatment Standards, and New Source Performance Standards*. By the end of our review, EPA had not yet published a preliminary or final effluent guideline program plan for the 2011-2012 planning cycle.

To document the results of EPA's process, we examined the agency's screening decisions for all industrial categories from 2003 through 2010. Specifically, we examined EPA's final effluent guideline plans and technical support documents for 2004, 2006, 2008, and 2010 and the agency's website to identify screening decisions and subsequent studies associated with particular industries. We examined these studies to identify those industries that EPA subjected to further review, which included an examination of available treatment technologies. Specifically, we examined preliminary and detailed studies for the 12 industries that EPA advanced beyond the screening phase into further review and selected 7 of them for more robust analysis to document how EPA had applied the process to those industries. The 7 industries were ore mining and dressing, coalbed methane extraction, steam electric power generation, chlorine and chlorinated hydrocarbon, drinking water treatment, pharmaceuticals management, and dental facilities. That analysis included in-depth interviews with EPA staff assigned to those industrial categories. These 7 industrial categories met our selection criteria that they be active or recently active, that is, that EPA was reviewing them or had made a decision to proceed or not to proceed with a rulemaking as recently as 2011 or 2012. We also documented the current status of any regulatory actions or other steps that EPA had taken with the other 5 industries that received a further review. We also

examined the planning documents for 2 industrial categories—airport deicing and construction and development—that did not go through EPA's 2003-2010 screening and review process but were the subject of regulatory activity during our study period.

To examine limitations to EPA's screening and review process, if any, that could hinder the effectiveness of the effluent guidelines program in advancing the goals of the Clean Water Act, we pursued three separate methodologies: we (1) interviewed a cross section of experts on EPA's effluent guidelines program, (2) surveyed the water quality permit directors of the 46 states that are authorized to issue permits for the National Pollutant Discharge Elimination System (NPDES), and (3) analyzed information about the hazard data sources EPA uses in its screening process.

We identified individuals for possible "expert" interviews by compiling a list of approximately 50 people from a variety of sources relevant to the effluent guideline program, including referrals from EPA, the Association of Clean Water Agencies, and the National Association of Clean Water Agencies and by consulting other knowledgeable individuals, relevant academic literature, and litigation documents. We classified the individuals by their affiliation with a particular stakeholder category (academia, industry, nongovernmental organization, or state and local water quality agencies). We then excluded from consideration 13 individuals for whom we could not obtain contact information. We called or sent an electronic message to those individuals for whom we had contact information to ask if they were familiar with EPA's current effluent guidelines screening and review process. We excluded from consideration those individuals who told us that they were not familiar with these processes, those who could not speak with us during the time frame of our review, and those who said they were not interested in contributing to our review. From our larger list of approximately 50 experts, we selected 22 individuals to interview whom we determined to be experts on the basis of their familiarity with the program and their affiliation with a particular stakeholder category. We conducted 17 interviews including these 22 individuals from February 2012 to April 2012. Six of these interviews were with officials from industry, 4 from academia, 4 from state and local government, and 3 from nongovernmental organizations. In 4 cases, more than one expert participated in an interview. We prepared and asked a standard set of questions about the overall effectiveness of the effluent guidelines program and EPA's use of hazard data, stakeholder input, and information on treatment technology in the screening process. We then

reviewed their responses to identify common themes. The sample of experts is a nonprobability sample, and we therefore cannot generalize their opinions across all experts on the effluent guideline program.

To assess the extent to which effluent guidelines might need to be revised, we conducted a web-based survey of state water quality directors, and we statistically analyzed the data. Appendix II presents a complete description of our survey and our data analysis.

To obtain information about an industry that EPA had not analyzed in a further review phase, we selected one of the nine industries that states in our survey said presented a risk to human health or the environment, had treatment technology available to reduce that risk, and warranted revision. We asked officials from the five states whose responses for the metal finishing industry met all three of the above criteria a standard set of questions about the risk the metal finishing industrial category posed, the technology available to mitigate this risk, and the likely effect of a revised effluent guideline.

We further interviewed experts about their views on the adequacy of the hazard data that EPA uses in its screening process—discharge monitoring reports and the Toxics Release Inventory—and whether the experts had suggestions for alternative data sources. We also reviewed EPA's own examinations of the benefits and limitations associated with the two data sources. EPA reports on these examinations of data quality in the technical support documents that accompany its effluent guideline program plans. In addition, we interviewed officials from EPA's Office of Enforcement and Compliance Assurance to learn about the management of the databases that store discharge monitoring data. We also interviewed officials from the Engineering and Analysis Division in EPA's Office of Water about possible effects that incomplete or inaccurate data could have on the screening process. We did not perform an independent assessment of data quality, although we concluded from the information we gathered that the data do have limitations that could affect EPA's screening process.

To examine the actions EPA has taken to address any limitations in its screening and review process, we interviewed effluent guideline program officials from the Engineering and Analysis Division about their plans to modify the biennial screening and review process. We also reviewed papers prepared for the division by a contractor, which describe new sources of data that the division could use to identify industrial categories potentially posing environmental hazards and warranting further review

for possible new or revised effluent guidelines. In addition, we interviewed officials from the Engineering and Analysis Division, the Office of Wastewater Management, and the Office of Enforcement and Compliance Assurance about agency efforts to revise the NPDES permitting process and the database that contains NPDES permit information. We conducted these interviews to determine what steps EPA has taken or could take to use these activities to improve the hazard and treatment technology data available for the screening process.

We conducted this performance audit from September 2011 to September 2012, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Survey of State Water Quality Permit Writers and Analysis of Views about Whether EPA Should Revise Effluent Guidelines

To assess the extent to which effluent guidelines might need to be revised, and to better understand the reasons for any such revisions, we conducted a web-based survey of state water quality officials, and we statistically analyzed patterns in the survey data. Our analysis identified numerous industries in numerous states for which state officials think that EPA should revise its guidelines. Furthermore, our analysis suggests that a few key factors—particularly, the significance of risk posed by effluent and the availability of pollution control technology—largely influence these officials' views about whether guidelines should be revised. Details about our survey and our data analysis follow.

Questionnaire Design

We designed our survey to ask respondents both (1) whether they thought EPA should revise effluent guidelines for certain industrial categories and (2) whether they thought the major factors that EPA considers when revising effluent guidelines were present for these industrial categories in their state. We reviewed EPA's 2002 draft *Strategy for National Clean Water Industrial Regulations* and identified the four key factors that the agency uses to determine whether effluent guidelines should be revised. These factors include (1) whether the effluent from a particular industrial category poses a significant risk to human health or the environment; (2) whether technology is available to substantially reduce the risk; (3) whether industry could adopt the technology without experiencing financial difficulty; and (4) whether other factors are present, such as whether current effluent guidelines for that industrial category are difficult to administer and whether revised guidelines could promote innovative regulatory approaches. We summarized these factors, using the exact language from EPA's guidance wherever possible, and wrote survey questions that were simple enough to yield valid responses. We determined that the fourth factor was too complicated to be expressed as a single survey question, and we divided it into two simpler questions. By designing the questionnaire in this way, we sought to increase the reliability of our survey data in two ways: First, asking respondents to assess each of the factors that EPA considers for revision before providing their views about whether EPA should revise effluent guidelines focused their attention on providing an informed opinion. Second, by obtaining data on both the decision-making factors and the need for effluent guideline revisions, we were able to conduct a statistical analysis to identify how these factors appear to influence states' views about the need for guideline revisions.

Our survey was divided into three sections. In the first section, we asked states to respond to a series of questions about each of the five industrial

categories that release the greatest amount of toxic effluent in their state. We originally considered surveying states about each of the 58 industrial categories regulated by effluent limitation guidelines. During initial interviews with state officials, however, we determined that this approach would be burdensome and impractical. Therefore, we used data on pollutant discharges from EPA's Toxics Release Inventory and discharge monitoring reports to select the five industries that discharged the greatest amount of toxic effluent in each state in 2010.[1] For each of these five industrial categories, we asked states six questions, the first five of which pertain to EPA's decision-making factors and the last of which pertains to the need for revised effluent guidelines. The six questions we asked about each industry are as follows:[2]

1. Are the existing effluent guidelines for this industry[3] sufficient on their own—that is, without additional water quality-based effluent limits—to protect your state from significant risks[4] to human health or the environment?

2. Is there a technology, process change, or pollution prevention action that is available to this industry that would substantially reduce any risks that remain after the state applies existing effluent limits?

[1]Although these data have certain limitations, which we describe elsewhere in this report, we determined they were sufficiently reliable for the purpose of selecting industries on which to focus our survey questions.

[2]Because state officials might not have complete information about all the key factors for each of the five industries, we allowed them to report their level of certainty in their response by answering each of the questions with either definitely yes, probably yes, probably no, definitely no, or don't know or no response. We collapsed these five categories into three categories—yes, no, and don't know or no response—for subsequent analysis.

[3]In the online version of the questionnaire, we customized the survey questions by inserting the name of each of the specific industries for each state.

[4]We based our survey questions on EPA's draft 2002 strategy, which uses the term *risk* rather than the term *hazard*. To be consistent with the precise wording of the survey questions, we use the term *risk* when describing the survey results. Elsewhere in this report, we use the term *hazard* in accordance with our discussions with EPA officials about the agency's screening process, in which contaminants are first assessed for hazard and then assessed for risk.

3. Do you think this industry can afford to implement this risk-reducing technology, process change, or pollution prevention action without experiencing financial difficulty?

4. Are the current effluent guidelines for this industry difficult to understand, implement, monitor, or enforce?

5. Do you think the current effluent guidelines for this industry could be revised to promote innovative approaches, such as water quality trading or multimedia benefits?

6. Given your responses to the previous questions, do you think EPA should revise the current effluent guidelines for this industry?

In addition to asking about the top five industrial categories in each state, we asked states about two other sets of industrial categories. First, we asked state officials to list up to three other categories that were not among the top five in their state but for which they thought the effluent guidelines should be revised. Second, we asked these officials to list up to three categories that are not regulated by effluent guidelines but for which they think EPA should consider developing guidelines. To be confident that our questions would yield reliable data, we conducted four pretests with state officials. During these pretests, we sought to determine whether the questions were clear, could be reliably answered, and imposed a reasonable burden on respondents.

Survey Respondents

We administered our survey to the directors of the water quality programs in the 46 states that are authorized to implement NPDES. These state officials are largely responsible for issuing permits to industrial facilities and for incorporating effluent guidelines into those permits. They have regular, firsthand experience with the guidelines, and their experience may supplement EPA's information on effluent. We determined that these officials were therefore sufficiently knowledgeable to answer our survey questions. We obtained a list of these officials and their contact information from EPA and verified this list through Internet searches and phone calls with state officials. We identified the primary contact for each state but asked these individuals to consult with others in their office to determine the most accurate answer for each survey question.

Survey Administration

We implemented our survey as a web-based questionnaire. We notified the state water quality permit directors in February 2012 of our intent to conduct the survey and requested their participation. We instructed the states on how to access the web-based survey on March 2, 2012. We sent three e-mail reminders and telephoned states that had not responded before we closed the survey in April. We received responses from 31 of the 46 states, for an overall response rate of 67 percent of states. The survey data are based on responses from 42 individuals in these 31 states. Because we surveyed state officials only about the industrial categories that discharge the greatest amount of toxic effluent in their state, and because several states did not respond to our survey, the results of our analysis are not generalizable to all industrial categories in all states.

Summary of Survey Responses

To determine the extent to which state officials think that effluent guidelines should be revised, we analyzed the univariate frequencies of responses to our six primary survey questions. We aggregated the survey responses to create industry-by-state cases, such that each case represented the views of a particular state about the guidelines for a particular industrial category in that state. The completed survey questionnaires from 31 states led to 155 possible state-by-industry cases. Because not all states responded to all of the survey questions, however, we had at most 123 valid cases for analysis, depending upon the survey question. A summary of the responses to these questions appears in table 5.

Table 5: State Officials' Responses to the Key Questions in Our Survey for the Industries Discharging the Greatest Amount of Toxic Effluent in Their State

	Probably yes or definitely yes (percentage)	Probably no or definitely no (percentage)	Don't know or no response (percentage)	Total number of cases[a] (percentage)
Are the existing effluent guidelines for this industry sufficient on their own—that is, without additional water quality-based effluent limits—to protect your state from significant risks to human health or the environment?	51 (42)	69 (57)	2 (2)	122 (100%)
Is there a technology, process change, or pollution prevention action available to this industry that would substantially reduce any risks that remain after the state applies existing effluent limits?	38 (31)	51 (41)	34 (28)	123 (100)

	Probably yes or definitely yes (percentage)	Probably no or definitely no (percentage)	Don't know or no response (percentage)	Total number of cases[a] (percentage)
If yes to the previous question: Do you think this industry can afford to implement this risk-reducing technology, process change, or pollution prevention action without experiencing financial difficulty?	31 (82)	2 (5)	5 (13)	38 (100)
Are the current effluent guidelines for this industry difficult to understand, implement, monitor, or enforce?	30 (24)	91 (74)	2 (2)	123 (100)
Do you think the current effluent guidelines for this industry could be revised to promote innovative approaches, such as water quality trading or multimedia benefits?	44 (36)	59 (48)	19 (16)	122 (100)
Given your responses to the previous questions, do you think EPA should revise the current effluent guidelines for this industry?	63 (51)	60 (49)	0 (0)	123 (100%)

Source: GAO analysis of survey data.

[a]This column represents all cases for which the survey respondent selected one of the response options, which included "don't know/no response." It does not include responses from individuals who skipped the question entirely.

These tabulations indicate that a substantial number of cases exist for which states thought that EPA should revise effluent guidelines and also for which they perceived that one or more of EPA's decision-making factors were present. In 51 percent (63 of 123 cases), state officials said that EPA should revise the effluent guidelines for the corresponding industry. With regard to whether the key decision-making factors were present, state officials reported that effluent posed a significant risk in 57 percent of cases, that technology was available in 31 percent of cases, that the guidelines were difficult to administer in 24 percent of cases, and that revised guidelines could promote innovative approaches in 36 percent of cases. We had far fewer responses to our question about whether industry could adopt technology without experiencing financial difficulty because that question was applicable only if the respondent said such technology was available. Among these cases, state officials reported that the technology would not cause financial hardship to the industry in 82 percent of cases (31 of 38 cases).

We repeated this analysis after removing the 29 cases representing the three industrial categories whose effluent guidelines are in revision, leaving at most 96 cases for analysis, depending upon the question. Of the remaining cases, state officials said that EPA should revise the

effluent guidelines for a substantial percentage of them; they also said that key decision-making factors were present in a substantial percentage of cases. For example, in 46 percent of these cases, state officials said that EPA should revise the effluent guidelines for the corresponding industry.

Relationships between Key Decision-Making Factors and States' Views about Whether EPA Should Revise Effluent Guidelines

We compared state officials' views about whether effluent guidelines should be revised with their views of each of the factors that EPA uses when considering guideline revisions. For three of the four factors, our results show that when state officials perceived the factor to be present, they were significantly more likely to think that EPA should revise the effluent guidelines for the corresponding industrial category. (We had too few cases with valid responses to the survey question about cost to determine whether that factor was significantly associated with views about guideline revisions.) The risk posed by effluent and the availability of technology were the strongest predictors of states' views about the need for guideline revisions. In particular, we found the following:

- When state officials perceived effluent from a particular industrial category to pose a significant risk, they were 3.8 times more likely to think that EPA should revise the guidelines for that category than when they did not perceive the effluent to pose a significant risk. Specifically, among the cases in which state officials perceived effluent to pose a significant risk, they thought the effluent guidelines should be revised 75 percent of the time (52 of 69 cases), compared with 20 percent of the time (10 of 51 cases) when they thought the effluent did not pose a significant risk.

- When state officials perceived technology to be available to substantially reduce the risk for a particular industrial category, they were 4.3 times more likely to think that EPA should revise the guidelines for that category than when they did not perceive technology to be available. Specifically, among the cases in which these officials perceived technology to be available, they thought EPA should revise the effluent guidelines 84 percent of the time (32 of 38 cases), compared with 20 percent (10 of 51 cases) when they thought that technology was not available.

- When state officials thought that other factors were present for a particular industrial category, they were 2.3 times more likely to think that EPA should revise the guidelines than when they did not think these factors were present. "Other factors" refers to either that the

current guidelines were difficult to understand, implement, monitor, or enforce or that revised guidelines could promote innovative approaches. Specifically, when state officials thought that such other factors were present, they thought that EPA should revise its effluent guidelines 70 percent of the time (43 of 61 cases), compared with 30 percent of the time (18 of 60 cases) when they thought these factors were not present.

Table 6 presents the complete results of these bivariate comparisons. We excluded one of the factors from the discussion above—namely, whether the industry could afford to implement the technology, process change, or pollution prevention action—because the responses to this question applied only to the subset of cases for which such a technology, change, or action was available, only 33 of which provided a yes or no response. In 87 percent of those cases in which the technology was perceived to be affordable (27 of 31 cases), state officials said that EPA should revise its guidelines for the corresponding industry. We repeated this analysis after removing the 29 cases representing the two industrial categories whose effluent guidelines EPA is already revising. We found that, even after removing these cases, the same three factors retained a significant relationship with state officials' views about whether effluent guidelines should be revised. This result indicates that these key decision-making factors appear to influence state officials' views even for industrial categories whose guidelines EPA is not already revising.

Table 6: State Officials' Views about Whether EPA Should Revise the Effluent Guidelines for the Industries Discharging the Greatest Amount of Toxic Effluent in Their State, by the Four Factors EPA Considers When Deciding Whether to Revise Effluent Guidelines

	Do you think EPA should revise the current effluent guidelines for this industry?		
	Probably yes or definitely yes (percentage)	**Probably no or definitely no (percentage)**	**Total number of cases[a] (percentage)**
Are the existing effluent guidelines for this industry sufficient on their own—that is, without additional water-quality-based effluent limits—to protect your state from significant risks to human health or the environment?			
Probably yes or definitely yes	10 (20)	41 (80)	51 (100%)
Probably no or definitely no	52 (75)	17 (25)	69 (100)
Total	**62 (52)**	**58 (48)**	**120 (100)**
Is there a technology, process change, or pollution prevention action available to this industry that would substantially reduce any risks that remain after the state applies existing effluent limits?			
Probably yes or definitely yes	32 (84)	6 (16)	38 (100)

	Do you think EPA should revise the current effluent guidelines for this industry?		
	Probably yes or definitely yes (percentage)	**Probably no or definitely no (percentage)**	**Total number of cases[a] (percentage)**
Probably no or definitely no	10 (20)	41 (80)	51 (100)
Total[b]	**42 (47)**	**47 (53)**	**89 (100)**
If yes to the previous question: Do you think this industry can afford to implement this risk-reducing technology, process change, or pollution prevention action without experiencing financial difficulty?			
Probably yes or definitely yes	27 (87)	4 (13)	31 (100)
Probably no or definitely no	1 (50)	1 (50)	2 (100)
Total[c]	**28 (85)**	**5 (15)**	**33 (100)**
Are the current effluent guidelines for this industry difficult to understand, implement, monitor, or enforce or could the current effluent guidelines for this industry be revised to promote innovative approaches?[d]			
Probably yes or definitely yes	43 (70)	18 (30)	61 (100)
Probably no or definitely no	18 (30)	42 (70)	60 (100)
Total[a]	**61 (50)**	**60 (50)**	**121 (100%)**

Source: GAO analysis of survey data.

[a]This column represents all cases for which the survey respondent selected one of the response options, which included "don't know/no response," for both the question on whether EPA should revise its effluent guidelines and the question on whether a given factor was present. It does not include responses from individuals who skipped the questions entirely.

[b]Cases were excluded from this analysis if the response to either question in the cross-tabulation was "Don't know or no response."

[c]This question pertained only to the cases for which respondents answered that a technology, process change, or pollution prevention action was available.

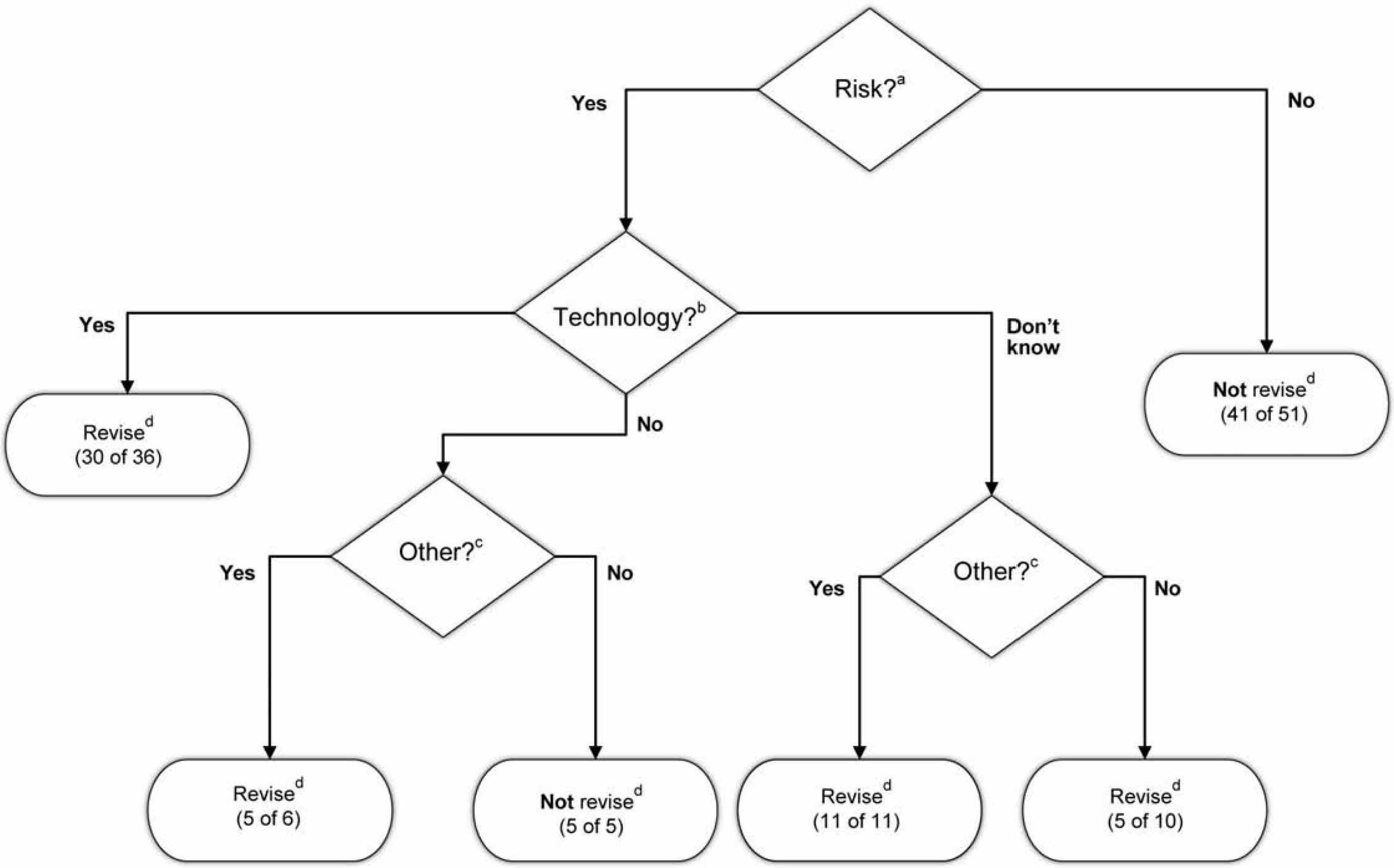
[d]This category combines two survey questions. Cases in this category were coded as "probably yes or definitely yes" if that response was given to either of the two questions.

Decision Tree of States' Views about Whether EPA Should Revise Effluent Guidelines

To understand how the various decision-making factors interact to influence states' views about the need for revised effluent guidelines, we used the data from our survey to conduct decision-tree analysis. We developed the decision tree by splitting the data into smaller and smaller subgroups according to whether state officials perceived each of the factors to be present for a particular industrial category. Beginning with the first factor, risk, we divided the cases into subgroups, depending upon whether state officials perceived the effluent from the particular industry to

pose a significant risk to human health or the environment. For each of these subgroups, we tabulated the number of cases in which state officials said the effluent guidelines should be revised, compared with the number of cases in which they said the guidelines should not be revised. We then split these subgroups again, according to whether state officials thought that technology was available to substantially reduce the risk. This split resulted in further subgroups. We continued splitting the data into smaller and smaller subgroups by next assessing state official's views of the cost of technology and finally assessing their views on the presence of other factors. At each step, we stopped splitting the data if (1) the original group had fewer than 10 cases, (2) the resulting subgroups did not differ significantly in terms of the percentages of respondents who said that EPA should revise the guidelines; or (3) the resulting subgroups tended to support the same conclusion as to whether EPA should revise the guidelines. We examined the cases terminating in each of the branches and found that the overall decision tree was based on a broad variety of industries and states. The resulting decision tree, which is shown in figure 5, has four splits and six branches.

Figure 5: Decision Tree of State Officials' Views of Whether EPA Should Revise Effluent Guidelines for Specific Industrial Categories



Source: GAO analysis of data from survey of state water quality officials.

Note: This analysis is based on 119 industry-by-state cases from our survey of state water quality permit writers. Each case represents the views of a single state about a single industry in that state.

[a]Whether the state official views the effluent from a particular industry to pose a significant risk to human health or the environment, according to their response to the first question on our survey.

[b]Whether the state official views technology to be available to substantially reduce the risk to human health or the environment, according to their response to the second question on our survey.

[c]Whether the state official views other factors to be present—such as current guidelines difficult to enforce or revised guidelines able to promote innovative approaches—according to the fourth and fifth questions in our survey.

[d]Based on responses to the sixth question on our survey, as to whether state officials think EPA should revise the effluent guidelines for a particular industrial category. The tabulations in parentheses represent the number cases in which state officials answered yes and no, respectively, to this question for each branch of the decision tree.

The decision tree illustrates how the key decision-making factors collectively predict states' views about whether EPA should revise effluent guidelines, and it corroborates the reliability of our survey data. Overall, when the risk of effluent was perceived to be significant and technology was perceived to be available, state officials overwhelmingly thought the corresponding effluent guidelines should be revised. Even when technology was not perceived to be available, many states still thought the guidelines should be revised if they thought that other factors were present. In particular, in three scenarios, corresponding to three branches of the decision tree, state officials generally said that effluent guidelines should be revised:

- When state officials thought that effluent from an industrial category poses a significant risk to human health or the environment and when they thought technology was available to substantially reduce that risk, they generally said that EPA should revise the effluent guidelines. In such instances, they thought that EPA should revise the effluent guidelines 83 percent of the time (in 30 of 36 cases). This scenario is illustrated by the far left branch of the decision tree.

- When state officials thought that effluent from an industrial category poses a significant risk, they generally thought that EPA should revise the effluent guidelines even when they perceived that technology was not available—as long as they perceived other factors to be present. In such instances, they thought that EPA should revise its effluent guidelines 83 percent of the time (5 of 6 cases). This scenario is illustrated by the second-to-left branch of the decision tree.

- When state officials thought that effluent from an industrial category poses a significant risk, they generally thought that EPA should revise the effluent guidelines even when they did not know if technology was available—as long as they perceived other factors to be present. In such instances, these officials thought EPA should revise its effluent guidelines 100 percent of the time (11 of 11 cases). This scenario is illustrated by the branch of the decision tree in the third column from the right.

By contrast, in two scenarios, state officials thought EPA should not revise the guidelines. In the primary scenario, officials did not perceive the effluent to pose a significant risk, although officials also thought that guidelines should not be revised when the risk was significant but neither technology nor other factors were present. In particular, our decision tree identified the following two scenarios:[1]

- When state officials did not think the effluent from a particular industrial category posed a significant risk to human health or the environment, they generally thought that EPA should not revise the corresponding effluent guidelines. In these instances, state officials thought that EPA should not revise the guidelines 80 percent of the time (41 of 51 cases). This scenario is illustrated by the branch of the decision tree on the far right.

- When state officials thought the effluent from a particular industrial category posed a significant risk but that technology was not available and other factors were not present, they generally said that EPA should not revise the effluent guidelines for that industry. In such instances, state officials thought that EPA should not revise the

[1]Responses were evenly split when risk was perceived to be present, state officials were uncertain whether technology was available, and they did not report that other factors were present. This split is illustrated by the branch of the decision tree in the second column from the right.

guidelines 100 percent of the time (5 of 5 cases). This scenario is illustrated by the branch of the decision tree in the third column from the left.

Industrial Categories for Which States Thought Effluent Guidelines Should Be Revised

Corresponding to this decision tree, we further examined the data to identify specific industrial categories that presented the strongest evidence for needing to be revised. Because the significance of risk and the presence of technology are the two primary decision-making factors, we selected the 30 cases for which states said these two factors were present and for which they said effluent guidelines should be revised. These cases fall into the far left branch of the decision tree in figure 5. These 30 cases represent 14 industrial categories: canned and preserved seafood processing; cement manufacturing; coal mining; fertilizer manufacturing; meat and poultry products; metal finishing; metal molding and casting; oil and gas extraction; ore mining and dressing; petroleum refining; pulp, paper, and paperboard; steam electric power generation; sugar processing; and timber products processing. We added industries that state officials cited in the second section of our survey, in which we asked them to identify industries that were not among the top five dischargers in their state. This addition lengthened the list by 22 cases, representing 7 additional industrial categories: centralized waste treatment, dairy products processing, electrical and electronic components, electroplating, grain mills manufacturing, landfills, and pharmaceutical manufacturing. In total, therefore, we identified 52 cases representing 21 industrial categories for which state officials thought effluent guidelines should be revised. Of these 52 cases, 39 represent industrial categories whose guidelines EPA is not already revising.

Appendix III: Additional Details on Industrial Categories with Effluent Guidelines

EPA has promulgated effluent guidelines for 58 industrial categories beginning in the mid-1970s. EPA has also revised the guidelines for most of those industries, although many have not been revised in recent years. As described elsewhere in this report, EPA uses a screening process to determine which categories may warrant further review and possible revision. According to our analysis, since EPA began using its current screening process in 2003, more than half the industrial categories with effluent guidelines did not advance beyond the screening phase in any year from 2003 to 2010 because, during a given 2-year screening cycle, the relative toxicity of their pollutant discharges did not put them among the top 95 percent of discharge hazard. Table 7 provides further information on the industrial categories, including the year their effluent guidelines were first promulgated, the year the guidelines were most recently revised, and the year(s) in 2004 through 2010 when their hazard ranking scores came within the top 95 percent.

Table 7: Years Effluent Guidelines Were Promulgated and Revised for Industrial Categories and Years the Categories Were in the Top 95 Percent of Total Reported Hazard, 2004-2010

			Year(s) the industrial category was in the top 95 percent of total hazard			
Industrial category	**Year promulgated**	**Year most recently revised**	**2010**	**2008**	**2006**	**2004**
Airport deicing	2012	Not revised				
Aluminum forming	1983	1988				
Asbestos manufacturing	1974	1995				
Battery manufacturing	1984	1986				
Canned and preserved fruits and vegetables processing	1974	1995				
Canned and preserved seafood processing	1974	1995				
Carbon black manufacturing	1978	1995				
Cement manufacturing	1974	1995	X			
Centralized waste treatment	2000	2003		X		
Coal mining	1985	2002	X			
Coil coating	1982	2007				
Concentrated animal feeding operations	2003	2008				
Concentrated aquatic animal production	2004	Not revised				
Construction and development	2009	Not revised				
Copper forming	1983	1986				
Dairy products processing	1974	1995				

Industrial category	Year promulgated	Year most recently revised	Year(s) the industrial category was in the top 95 percent of total hazard			
			2010	2008	2006	2004
Electrical and electronic components	1983	1985				
Electroplating	1981	1986				
Explosives manufacturing	1976	1995				
Ferroalloy manufacturing	1974	1995				
Fertilizer manufacturing	1974	1995	X	X	X	X
Glass manufacturing	1974	1995				
Grain mills	1974	1995				
Gum and wood chemicals manufacturing	1976	1995				
Hospital	1976	1995				
Ink formulating	1975	1995				
Inorganic chemicals manufacturing	1982	1984	X	X	X	X
Iron and steel manufacturing	1982	2005				
Landfills	2000	2000	X			
Leather tanning and finishing	1982	1996				
Meat and poultry products	2004	Not revised				
Metal finishing	1983	1986				
Metal molding and casting	1985	1986	X			
Metal products and machinery	2003	Not revised				
Mineral mining and processing	1975	1995	X			
Nonferrous metals forming and metal powders	1985	1989				
Nonferrous metals manufacturing	1984	1990	X	X	X	X
Oil and gas extraction	1979	2012[a]	X			
Ore mining and dressing	1982	1988	X	X	X	X
Organic chemicals, plastics, and synthetic fibers	1987	1993	X	X	X	X
Paint formulating	1975	1995				
Paving and roofing materials (tars and asphalt)	1975	1995				
Pesticide chemicals	1978	1998	X	X	X	
Petroleum refining	1982	1985	X	X	X	X
Pharmaceutical manufacturing	1983	2003				
Phosphate manufacturing	1974	1986				X
Photographic	1976	Not revised				
Plastics molding and forming	1984	1985	X		X	
Porcelain enameling	1982	1985				
Pulp, paper, and paperboard	1998	2012[a]	X	X	X	X

Industrial category	Year promulgated	Year most recently revised	Year(s) the industrial category was in the top 95 percent of total hazard			
			2010	2008	2006	2004
Rubber manufacturing	1974	1995	X			
Soap and detergent manufacturing	1974	1995				
Steam electric power generating	1982	2012[a]		X	X	X
Sugar processing	1974	1995				
Textile mills	1982	1983	X		X	X
Timber products processing	1981	2004				X
Transportation equipment cleaning	2000	2005				
Waste combustors	2000	2004	X	X		

Source: GAO analysis of EPA documentation.

Notes: In its screening phase, EPA ranks some industrial categories that are not subject to existing effluent guidelines and are therefore not included in this table. When EPA revised the effluent guideline for an industrial category, it may have revised just a portion of the guideline. For example, EPA may have added pollutants or changed the limits for a particular industrial category or added a new subcategory. In some cases, EPA may have made revisions that did not affect the stringency of the effluent guidelines. With the exception of three 2012 revisions, we did not determine the nature of the revisions shown in this table.

[a]The revisions to these industrial categories did not increase the stringency of the effluent guidelines.

Appendix IV: Comments from the Environmental Protection Agency

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

AUG 23 2012

OFFICE OF
WATER

Mr. David Trimble
Director, Natural Resources and Environment
U.S. Government Accountability Office (GAO)
Washington, D.C. 20548

Dear Mr. Trimble:

Thank you for sending us the draft of your proposed report entitled: ***EPA Has Improved Its Review of Effluent Guidelines but Could Benefit from More Information on Treatment Technologies*** (GAO-12-845). The Environmental Protection Agency (EPA) appreciates the time GAO has taken to research our annual review of industrial discharges, an element of our Effluent Limitations Guidelines (ELG) program, which is required under Sections 301, 304 and 306 of the Clean Water Act (CWA). You requested that we review the draft report and provide you with written comments.

I would like to highlight the importance of the ELG program to the EPA's clean water activities. As noted in your report, the EPA has published technology-based effluent limits for 58 major industrial categories (with over 450 subcategories) in the thirty-seven year history of the effluent guidelines program (started under the 1972 CWA). These national, technology-based limits are controlling pollution from close to 60,000 industrial facilities and annually prohibit the discharge of 700 billion pounds of pollutants to the Nation's surface waters. As a result, the ELGs substantially contribute to improvements in the quality of water nationwide.

Regarding your audit report, I believe the report adequately describes the well designed, rigorous, data-based approach used to determine which industries necessitate new or revised ELGs. In addition, your report concludes with three recommendations for improving our program, most of which we agree with in principle.

Your first recommendation is that we identify and evaluate additional sources of data on the hazards posed by industrial discharges and factor these into our annual reviews. We agree that additional sources of hazard data are valuable, and in fact we initiated an effort to begin collecting new sources of hazard information in 2011. At that time, the EPA examined approximately 12 different methods for factoring in more hazard data in its reviews and is currently applying some of those methods for the 2012 annual review. Furthermore, once the Preliminary 2012 ELG Plan is published, it will solicit additional ideas for new hazard data sources from the public and industry stakeholders. I believe we are making substantial progress in incorporating additional sources of hazard data and will continue to do so.

Your second recommendation is that we should identify and evaluate additional sources of information to improve our assessment of treatment technologies for industrial dischargers. I agree that treatment technology information is useful in our program and we have always evaluated such data. For example,

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in recent industry reviews, the EPA examined treatment technologies capable of removing sulfide from textiles, landfills, and pulp and paper wastewater discharges. We examined technologies for removing carbon disulfide from cellulose manufacturers, and we examined treatment technologies for ore mining and dressing, all a part of our efforts to screen these industries for the need for revised ELGs.

Given the importance of new treatment technology information, in 2011 we initiated efforts to gather more treatment information across all industry categories and will be expanding on this work in 2013 and 2014 once new fiscal year operating plans are in place. In addition, we will begin exploring ways to stimulate the development and use of innovative treatment technologies through the ELG program. Suffice it to say, the ELG program itself is a catalyst for new and innovative treatment technologies in setting high-performance effluent limitations that industry must meet, and industry can then choose to implement new and innovative technologies, or process improvements, to meet those requirements.

Your third recommendation suggests that we modify our industry screening process to include a thorough consideration of treatment technology early on in our screening phase. Although we agree factoring in treatment technology information in our reviews is valuable, I do not think this is a workable suggestion in the context of our current screening process. Conducting a thorough review of treatment technology as part of the current screening phase of all existing industry categories would be very resource intensive at this early stage in the process. As described above, the EPA is currently pursuing a more strategic approach to conduct literature reviews and research data analyses on new developments and emerging new technologies for industrial sectors which are screened in for further analysis.

The EPA currently is preparing new or revised ELGs for steam electric power generation (a major hazard source), coalbed methane extraction, shale gas extraction and dental amalgam (a significant source of mercury discharged to sewage treatment plants).

In summary, I appreciate the GAO's review of our program and its recommendations, and I look forward to continued enhancements of our industry review process.

Sincerely,

Ellen Gilinsky

for Nancy K. Stoner
Acting Assistant Administrator

Appendix V: GAO Contact and Staff Acknowledgments

GAO Contact

David C. Trimble, (202) 512-3841 or trimbled@gao.gov

Staff Acknowledgments

In addition to the individual named above, Susan Iott (Assistant Director), Elizabeth Beardsley, Mark Braza, Ross Campbell, Ellen W. Chu, Heather Dowey, Catherine M. Hurley, Paul Kazemersky, Kelly Rubin, Carol Hernstadt Shulman, and Kiki Theodoropoulos made significant contributions to this report. Wyatt R. Hundrup, Michael L. Krafve, Armetha Liles, and Jeffrey R. Rueckhaus also made important contributions to this report.

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United States
Environmental Protection
Agency

EPA's Review of Nutrients in Industrial Wastewater Discharge

December 2020

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U.S. Environmental Protection Agency
Office of Water (4303T)
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Docket EPA-HQ-OW-2018-0618
www.regulations.gov
DCN 08784

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1. Introduction

Nutrient pollution is one of the most widespread, costly, and challenging environmental problems impacting water quality in the United States. Excessive nitrogen and phosphorus in surface water can lead to a variety of problems, including eutrophication and harmful algal blooms, with impacts on drinking water, recreation, and aquatic life. A wide range of human activities contribute to nutrient pollution from both point sources and nonpoint sources, including stormwater discharges, runoff, septic systems, fertilizer, atmospheric deposition, and wastewater discharges. The U.S. Geological Survey (USGS) reported that about eight percent of the nitrogen and 24 percent of the phosphorus in U.S. waters come from point sources (USGS, 1996), although the distribution of sources and the ratio of municipal and industrial point sources to nonpoint source contributions varies greatly by region and watershed. For example, in the Chesapeake Bay, point sources in some tributary watersheds contribute up to 40 percent of the nitrogen, and up to 45 percent of the phosphorus (Ator et. al., 2011).

As part of the 2017 and 2018 annual review of effluent limitations guidelines and standards (ELGs) and to more comprehensively screen industrial wastewater as a source of nutrients, EPA initiated a cross-industry review of publicly available data on nutrient discharges from industrial point source categories (PSCs) as part of its 2018 annual review of effluent limitations guidelines and standards (ELGs), as described in the *Preliminary Effluent Guidelines Program Plan 14* (Preliminary Plan 14) (U.S. EPA, 2019a). For that review, EPA ranked and prioritized PSCs for further review based on their annual reported discharges of nutrients in wastewater and developed a method to estimate potential nutrient discharges from industrial facilities that are likely to discharge nutrients but are not reported in the publicly available discharge data.

In support of its 2019 annual review of ELGs, EPA updated and refined the cross-industry review of nutrient discharges. Specifically, EPA refreshed the nutrient discharge rankings and nutrient estimations using 2018 discharge monitoring report (DMR) data and combined the reported and estimated data to assess the total potential nutrient discharges from each PSC. To provide additional context for the discharges, EPA also began analyzing industrial discharges to nutrient impaired waters.

Section 2 of this report presents the methodology and results of EPA's 2019 review of nutrients in industrial wastewater discharges. Section 3 of this report presents the PSCs prioritized for further investigation based on this review. EPA has identified the following PSCs for further review:

- Fertilizer Manufacturing (40 CFR Part 418)
- Explosives Manufacturing (40 CFR Part 457)
- Plastics Molding and Forming (40 CFR Part 463)
- Miscellaneous Foods and Beverages (no current ELGs)

In its Preliminary Plan 14, EPA identified Meat and Poultry Products (40 CFR Part 432) for further review (U.S. EPA, 2019a). EPA is continuing to study and collect data on this PSC. See Section 6.5 of the *Effluent Guidelines Program Plan 14* (Plan 14) for details on this study (U.S. EPA, 2021).

2. NUTRIENT DISCHARGE RANKINGS

For the 2019 cross-industry review of nutrients, EPA used 2018 publicly available data to screen industrial categories based on reported and estimated total nitrogen and total phosphorus loads discharged to receiving waters. The goal of this review was to identify additional industries with potentially greater nutrient loads relative to other PSCs and prioritize for further review those PSCs that may be candidates for controlling nutrient discharges through ELGs development or revision.

EPA followed a methodology similar to the one it used for the 2018 cross-industry review of nutrient discharges, which was presented in *The EPA's Review of Nutrient in Industrial Wastewater Discharge* (the Previous Nutrients Report) (U.S.EPA, 2019b). For this review, however, EPA combined the reported and estimated nutrient discharge data to assess total potential nutrient discharges across industries. Sections 2.1, 2.2, and 2.3 describe the data sources, data quality review, and methodology used to assess nutrient discharges, respectively. Section 2.4 presents the nutrient discharge ranking results. Section 2.5 presents the methodology for the impaired waters analysis.

2.1 Nutrient Discharge Rankings Data Sources

Consistent with its previous cross-industry review of nutrients, EPA downloaded and analyzed 2018 DMR data from EPA's Water Pollutant Loading Tool (Loading Tool).[1,2] EPA used 2018 DMR data because it represents the most recent complete calendar year of industrial wastewater discharge data available at the time of this review. This section describes this data source and why its use is appropriate for this analysis.

More than 350,000 industrial facilities and an estimated 15,700 publicly owned treatment works (POTWs) held National Pollutant Discharge Elimination System (NPDES) permits for wastewater discharges to waters of the United States in 2018 (U.S. EPA, 2020a).[3] Facilities report discharge data to their permitting authority using DMRs. A majority of permitting authorities report DMR data to EPA's program system database, Integrated Compliance Information System for the National Pollutant Discharge Elimination System (ICIS-NPDES); therefore, the ICIS-NPDES database continues to be the most comprehensive data source quantifying pollutants discharged directly to surface waters of the United States.

The Loading Tool consolidates DMR data from ICIS-NPDES. These data include, but are not limited to, facility-, outfall-, and monitoring-period-specific pollutant discharge concentrations, quantities, wastewater flows, and, where available, pollutant-specific permit limits. The Loading Tool estimates the annual load of pollutants discharged (pounds per year) from specific industrial facilities to surface water using reported concentrations or quantities and flow data. The *Technical Users Background Document for the Discharge Monitoring Report (DMR) Pollutant Loading Tool Version 1.0* (Loading Tool Technical Users Document) (U.S. EPA, 2012) provides details on the development of the Loading Tool,

[1] See https://echo.epa.gov/trends/loading-tool/water-pollution-search.
[2] Because the nutrient discharge rankings methodology specifically includes an analysis of concentration data, EPA did not use TRI data, which only includes reported annual loadings, for this review. Additionally, Emergency Planning and Community Right-to-Know Act (EPCRA) Section 313 Chemical List only includes the following nutrient parameters: ammonia, nitrate compounds, and yellow or white phosphorus compounds.
[3] Facility counts obtained from a search of the Loading Tool in March 2020 for DMRs submitted in 2018.

including its objectives and requirements, development procedure, calculations, user querying capabilities, and quality assurance steps.

The nutrient parameters reported in DMRs vary by industry and NPDES permit and may include total nitrogen, ammonia, nitrate, phosphate, total phosphorus, and/or other nitrogen or phosphorus species. To facilitate analyses and comparisons of the nutrient data, the Loading Tool calculates aggregated annual loads for total nitrogen and total phosphorus for a given facility, based on that facility's reported loads of individual nitrogen and phosphorus parameters. Section 2.1.3.1 in the previous Nutrients Report discusses the established nutrient aggregation method within the Loading Tool for DMR data.

EPA imported the aggregated total nitrogen and total phosphorous DMR data from EPA's Loading Tool for calendar year 2018 into a set of static databases,[4] referenced below, to preserve the integrity of the data and support subsequent review of the pollutant loadings data.

- *2018 DMR Data – Total Nitrogen* (ERG, 2020a). Total nitrogen pollutant loadings in direct wastewater discharges (pounds per year) from industrial facilities in calendar year 2018.
- *2018 DMR Data – Total Phosphorus* (ERG, 2020b). Total phosphorous pollutant loadings in direct wastewater discharges (pounds per year) from industrial facilities in calendar year 2018.

Specifically, EPA downloaded the following data into each database:

- Facility name, location, and NPDES permit number.
- Facility Standard Industrial Classification (SIC) code, if reported.
- Aggregated annual total nitrogen and total phosphorus load (lb/yr), respectively.
- Annual facility flow discharged (MGD).

The data collected in the ICIS-NPDES data system are an appropriate data source for this analysis and are particularly useful for ELG planning for the following reasons:

- ICIS-NPDES is national in scope, including data from all 50 states and 21 U.S. territories and tribes.
- Discharge reports included in ICIS-NPDES are based on effluent chemical analysis and metered flows using known analytical methods.
- ICIS-NPDES includes discharge data for facilities with an NPDES permit; therefore, the data are not limited to certain industries.

However, EPA acknowledges the considerations of the DMR data collected in the ICIS-NPDES data system, which include:

- ICIS-NPDES contains data only for pollutants that a facility is required, by permit, to monitor; the facility is not required to monitor or report all pollutants discharged, such as

[4] EPA downloaded aggregated total nitrogen and total phosphorus data from the Loading Tool in May 2020.

nutrients. As a result, reported discharges of nutrients vary significantly within and among industries based on whether the permitting authority has established permit limits or monitoring requirements.

  - EPA's Nutrient Estimation Tool (discussed below in Section 2.3.2) helps to address the data gaps in the available industrial wastewater discharge data by identifying facilities operating in industries likely to discharge nutrients and estimating the amount of nutrients that these facilities may discharge based on reported discharges from similar facilities.

- ICIS-NPDES does not include data characterizing discharges from industrial facilities to POTWs (indirect discharges).
- ICIS-NPDES contains data on permitted features (e.g., external outfall), but does not explicitly identify the type of wastewater being discharged (e.g., process wastewater, stormwater, noncontact cooling water). In some cases, the type of wastewater may be deduced from the name or description of the outfall reported by the facility; however, total flow rates reported may include non-process wastewater such as stormwater and noncontact cooling water as well as process wastewater.

Bearing in mind these factors, EPA determined that the DMR data in the Loading Tool are a robust and reliable source of information on industrial wastewater nutrient discharges, particularly for this initial screening-level review. Throughout this report, where appropriate, EPA acknowledges when the aspects listed above are relevant to the analyses.

2.2 Nutrient Discharge Rankings Data Quality Review

EPA evaluated the completeness, accuracy, and reasonableness of the DMR data downloaded from the Loading Tool. Based on the quality review, EPA determined that data were useable to support the nutrients rankings and cross-industry nutrients review.

Section 3 of the Loading Tool Technical Users Document describes the underlying ICIS-NPDES data extraction and loading calculations (U.S. EPA, 2012). Section 5 of the Loading Tool Technical Users Document describes the specific quality control procedures built into the Loading Tool, which include checks for completeness, comparability, accuracy, and reasonableness, to identify and address any quality issues (U.S. EPA, 2012). The Loading Tool extracts ICIS-NPDES data and calculates loads weekly. Routine quality control procedures that are part of the weekly refresh include flagging potential outliers and autocorrecting misreported units and unreasonable flow values (U.S. EPA, 2012).

In addition to the quality control procedures conducted by the Loading Tool, EPA conducted additional data quality reviews of the 2018 DMR data used for the Agency's nutrient discharge rankings analysis, as described below.

Completeness. For the completeness check, EPA compared the 2017 and 2018 counts of facilities reporting discharges for total nitrogen and total phosphorus, shown in Table 2-1, to ensure that there were no gaps that would indicate an incomplete data download. As EPA anticipated, the 2018 dataset was larger than the 2017 dataset as additional facilities have nitrogen or phosphorus limits and monitoring requirements added to permits each year. Thus, EPA considers there are no issues with completeness in the 2018 dataset.

Table 2-1. Results of 2018 DMR Data Completeness Check

Nutrient	Number of Industrial Dischargers with DMR Data[5]			
	Major		Non-Major	
	DMR 2017	DMR 2018	DMR 2017	DMR 2018
Total Nitrogen	1,236	1,238	16,346	16,443
Total Phosphorus	793	821	8,336	8,714

Source: U.S. EPA, 2020a

Accuracy and reasonableness. To evaluate the data's accuracy and reasonableness, EPA identified potential outliers and reviewed the data in more detail to determine if the data were the result of a potential data entry error and warranted correction (e.g., unit errors, such as data entered as "2.7 grams" instead of "2.7 milligrams"). Note that EPA did not review data from facilities in categories where the ELGs were promulgated or revised in the past seven years.[6] EPA used the following criteria to identify outliers:

1. Facility's total nitrogen or total phosphorus load makes up over 90 percent of the total load of the category.
2. Facility's load of total nitrogen or total phosphorus is over 1 million lb/yr.
3. Facility's annual flow is over 100,000 Mgal/yr.

For identified outliers, EPA used the Enforcement and Compliance History Online (ECHO) effluent charts, which graph the facility's submitted monitoring data from all years to investigate and determine if the outlier data resulted from potential reporting errors. EPA identified a data point as a potential reporting error if it was two or more orders of magnitude larger than the data reported in previous years. EPA identified nine data points from seven facilities as reporting errors. EPA made corrections to the outliers and recalculated the annual discharge load for the affected facilities (ERG, 2020c). See Appendix A for a list of the data corrections.

EPA also reported potential DMR data errors to its Integrated Error Correction Process (IECP), via the Error Report feature built into the Enforcement and Compliance History Online (ECHO) website. EPA's IECP sends reported issues to EPA and to state data stewards for further evaluation and correction. IECP has confirmed the issues identified in the error reports for three facilities (four data points) as of March 2020 and is reviewing the other error reports submitted.

2.3 Nutrient Discharge Rankings Methodology

DMR data are only available for pollutants specified in NPDES permits. Currently, only 14 of the 59 ELGs contain limitations for nitrogen and/or phosphorus parameters (11 for a nitrogen parameter only, one for a phosphorus parameter only, and two for a nitrogen and a phosphorus parameter) (U.S. EPA,

[5] To provide an initial framework for setting permitting priorities, EPA classified industrial and municipal wastewater discharges as either major or non-major. Major discharges usually have the potential to impact receiving waters if not controlled and, therefore, have received more regulatory attention than non-major discharges.
[6] 40 CFR part 450 - Construction and Development [Revised March 6, 2014], 423 - Steam Electric Power Generating [Revised 2020], 435 - Oil and Gas Extraction [Revised June 2016], 441 - Dental Office [Promulgated June 14, 2017].

2019b).[7] Facilities may also have permit limits for nutrients to meet specific water quality standards or requirements. Overall, the limits included in facility permits for nutrients vary widely. As presented in the Preliminary Plan 14, EPA developed the Nutrient Estimation Tool (Nutrient Tool) to fill gaps in the available industrial wastewater discharge data. The Nutrient Tool identifies and estimates nutrient discharges for industries whose nutrient discharges may be underrepresented in the DMR dataset. See Section 5.1 of EPA's Previous Nutrients Report for a discussion of the data sources and methodology of the Nutrient Tool (U.S. EPA, 2019b).[8]

For the 2019 cross-industry nutrients review, EPA updated its nutrient discharge rankings based on the 2018 reported load combined with the load estimated for 2018 using the Nutrient Tool methodology to evaluate the total potential nutrient discharges for each PSC. EPA also evaluated the median 2018 nutrient load discharged and the range of nutrient concentrations discharged by facilities in each industry to aid in prioritizing specific PSCs for further review.

Sections 2.3.1, 2.3.2, and 2.3.3 below describe the methodology EPA followed for developing the nutrient discharge rankings. Section 2.4 presents the results of the nutrient discharge rankings.

As part of this nutrients review, EPA also developed a methodology to evaluate the number of facilities discharging to nutrient impaired waters and the percent of the reported nutrient load discharged to nutrient impaired waters. EPA assessed the impaired waters information for prioritized PSCs to provide additional context for the impacts of discharges. Section 2.5 provides a discussion of this analysis.

2.3.1 Linking Individual Facilities to PSCs

As a first step, EPA used established crosswalks within the Loading Tool to relate individual facility and subsequent parameter-level data to the most appropriate PSC or potential PSC, commonly based on the facility's reported SIC or North American Industry Classification System (NAICS) code. These links enable EPA to analyze discharges across PSCs. See Section 3 of the Loading Tool Technical Users Document for more information on these crosswalks (U.S. EPA, 2012). The crosswalks associate the facility discharges for each parameter to a PSC to account for cases when more than one ELG may apply to a specific facility. For example, if a facility's process operations include both meat slaughtering and a leather tannery, the facility's discharges may be regulated under Meat and Poultry Products (40 CFR 432) or Leather Tanning and Finishing (40 CFR 425). The crosswalk may associate a specific parameter discharge to one of these PSCs, based on information EPA gathered on the process operations and the sources of the pollutants discharged. This enables EPA to consider the pollutant discharges only in association with the most appropriate PSC. For the nutrient discharge rankings, EPA used the facility-to-PSC crosswalk as of May 2018 (ERG, 2020a and 2020b).

EPA notes that the facility-to-PSC crosswalk may not link all facilities regulated under the appropriate PSC. Because most PSCs are not defined by SIC code, a single SIC code may include facilities in more than one PSC; hence, associating a SIC code with only one category may be an over-simplification.

[7] EPA did not include PSCs with requirements that include zero discharge of pollutants.
[8] The Nutrient Tool includes discharges of total nitrogen, ammonia (as N), nitrate (as N), total phosphorus, and phosphate (as P). The Tool does not use data from the TRI because TRI data do not include underlying pollutant concentrations or wastewater flows.

Many facilities have operations subject to more than one PSC. Further, facilities in some categories cannot be identified by SIC code (e.g., Centralized Waste Treatment facilities).

EPA updates and refines the facility-to-PSC crosswalk as it gathers updated information, or, in some cases, performs a facility-specific assessment of the process operations generating wastewater. The most updated version of the crosswalk is available for download on the Loading Tool Resources web page.

2.3.2 Evaluating Reported Nutrient Discharges

Within the static databases for total nitrogen and total phosphorous, EPA summed the reported facility aggregated total nitrogen and total phosphorous loads in each PSC, based on the crosswalk links discussed above, to calculate a reported total nitrogen and total phosphorous load by category.

To provide additional context for the reported discharges, EPA used the load and flow reported by each facility to calculate and determine the range of total nitrogen and total phosphorus concentrations discharged by facilities in each PSC, including the first quartile, median, and third quartile. The first and third quartiles are the values below which 25 percent and 75 percent of the data points fall, respectively. The median, or second quartile, is the value below which 50 percent of the data points fall. Figure 2-1 is an example of the first quartile, median, and third quartile.

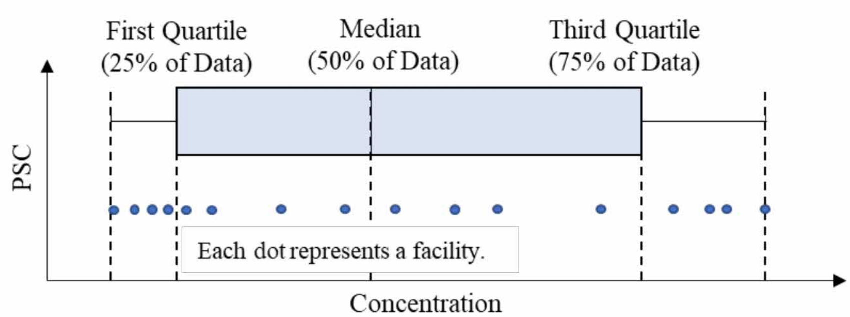

Figure 2-1. Example of First Quartile, Median, and Third Quartile Reported Concentration Values for a Pollutant

2.3.3 Estimating Additional Nutrient Discharges

EPA incorporated the Nutrient Tool methodology, described in its Previous Nutrients Report (U.S. EPA, 2019b), into the static databases for total nitrogen and total phosphorous to estimate additional nutrient discharges that may be underrepresented in the 2018 reported DMR data.

The Nutrient Tool uses known nutrient discharge data within defined industrial sectors or subsectors (based on SIC codes), as reported on DMRs, to estimate nutrient discharges for facilities within that sector or subsector that do not have reported nutrient discharges but are likely to discharge nutrients. The estimation considers, within each SIC code, elements such as the median nutrient concentration and flow, as well as the percent of facilities within the sector or subsector that have reported discharges. See the memorandum *Nutrient Estimation Tool Version 1.1: Detailed Data Processing Steps* for information on data processing and database query logic (ERG, 2020d).

The Nutrient Tool performs the following steps to estimate nutrient loads for facilities with flow that have not reported nutrient discharges.

1. For facilities with reported nutrient discharges, the Nutrient Tool groups facilities by SIC code and calculates a median concentration for each SIC code. The Nutrient Tool further groups the facilities within each SIC code that have similar flow rates and calculates a median concentration for each SIC code/flow group.
2. The Nutrient Tool uses the two criteria below to determine whether the reported discharges within a SIC code can be used to estimate discharges more broadly within the SIC code.
   - The median annual reported concentration by facilities within the overall SIC code is greater than the relevant nutrient concentration benchmark. Consistent with its previous nutrients review, EPA used 0.1 mg/L for total nitrogen and 0.01 mg/L for total phosphorus based on method detection limits application to industrial wastewater (NCASI, 2011; U.S. EPA, 1993). This ensures that the tool is estimating loads for nutrients based on concentrations that are typically at or above detectable quantities.
   - The percent of facilities within a SIC code that report discharges for the nutrient is greater than five percent.
3. For facilities without reported nutrient discharges (and with flow) that are within a SIC code that is "likely to discharge," the Nutrient Tool calculates an estimated nutrient load using the facility's reported flow and the median nutrient concentration from the relevant SIC code/flow group.

For a discussion of the considerations of the Nutrient Tool, see Section 5.1.2 of the Previous Nutrients Report (U.S. EPA, 2019b). EPA received public comments on Preliminary Plan 14 regarding the Nutrient Tool and took these comments into consideration for the current nutrient discharge rankings. To see EPA's responses to these comments, see the *Comment Response Document for Preliminary Plan 14* (U.S. EPA, 2020b). Using the crosswalks discussed in Section 2.3.1, EPA summed the estimated facility loads within each PSC to calculate a total estimated load for each category.

2.4 Nutrient Discharge Rankings Results

EPA added the estimated and reported total nitrogen and total phosphorous loads for each PSC and ranked the categories based on the total reported plus estimated load. EPA also calculated the range of concentrations across the combined reported and estimated data sets. Appendix B provides the complete DMR 2018 rankings for total nitrogen and total phosphorus. The rankings include the following information for each PSC:

- *2018 Reported load (pounds per year).* Aggregated annual reported loads of total nitrogen and total phosphorus discharged by facilities.
- *2018 Estimated load (pounds per year).* Aggregated annual estimated loads of total nitrogen and total phosphorus discharged by facilities.
- *2018 Total load (pounds per year).* Aggregated annual reported plus estimated load of total nitrogen and total phosphorus discharged by facilities.

- *Percent of total load that is estimated.* Percent of total load in each PSC that was estimated in 2018.
- *Median facility load (pounds per year)*. Median load calculated using reported and estimated loads by facilities in 2018.
- *First percentile, median, and third percentile of reported concentrations (mg/L)*. Range of reported concentrations by facilities in 2018 by presenting the first, median (i.e., second), and third percentile concentration.
- *Number of facilities with reported loads.* Count of facilities that reported discharges in 2018.
- *Number of facilities with estimated loads*. Count of facilities for which the Nutrient Tool estimated discharges in 2018.
- *Total number of facilities in dataset.* Count of all facilities that submitted discharge data in 2018.

The nutrient discharge rankings results based on the 2018 DMR data show that industrial facilities reported discharges of more than 205,000,000 pounds of total nitrogen and 25,500,000 pounds of total phosphorus directly to surface waters (ERG, 2020a and 2020b). With the Nutrient Tool, EPA estimated that industrial facilities may have discharged an additional 215,000,000 pounds of total nitrogen and 128,000,000 pounds of total phosphorus directly to surface waters in 2018 (ERG, 2020a and 2020b).

Figure 2-2 presents the total discharged load (reported and estimated) of total nitrogen by the top 10 PSCs. Figure 2-3 presents the total discharged load (reported and estimated) of total phosphorus by the top ten PSCs. Section 3 discusses EPA's prioritization of PSCs for further review based on the nutrient discharge rankings.

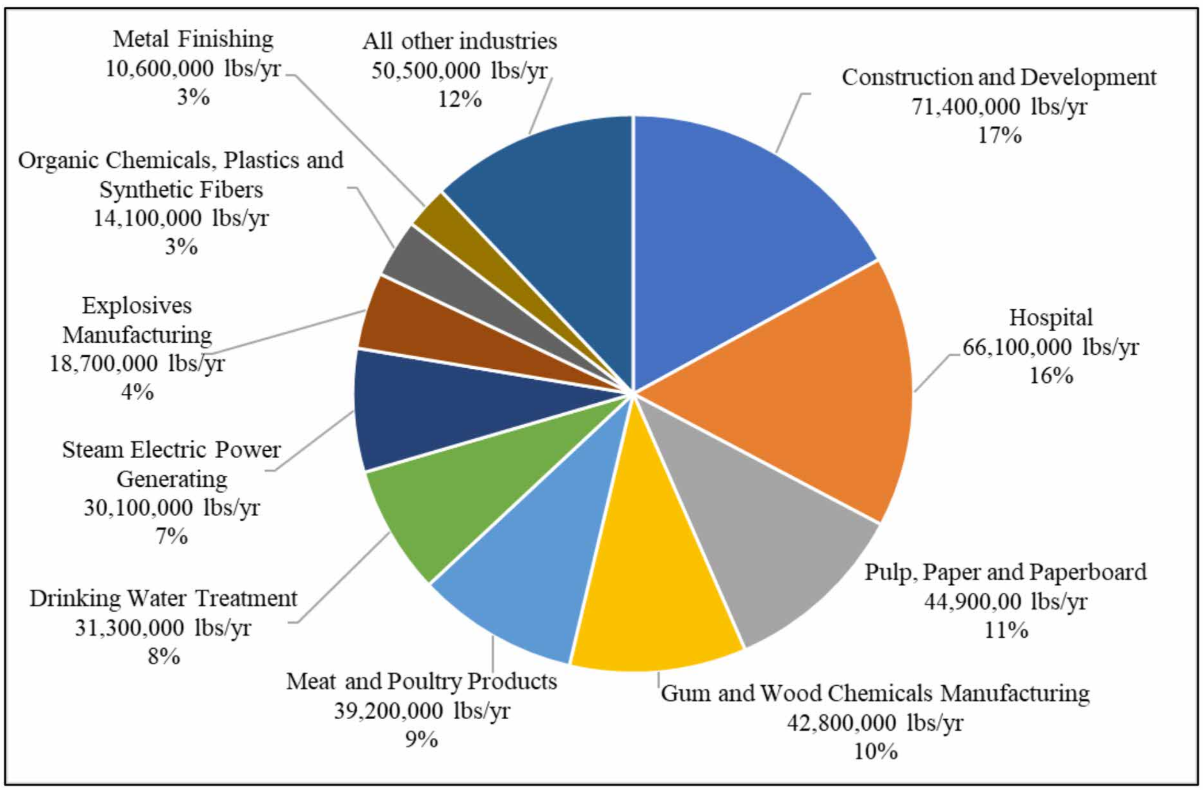

Figure 2-2. Top Ten PSCs Discharging Total Nitrogen

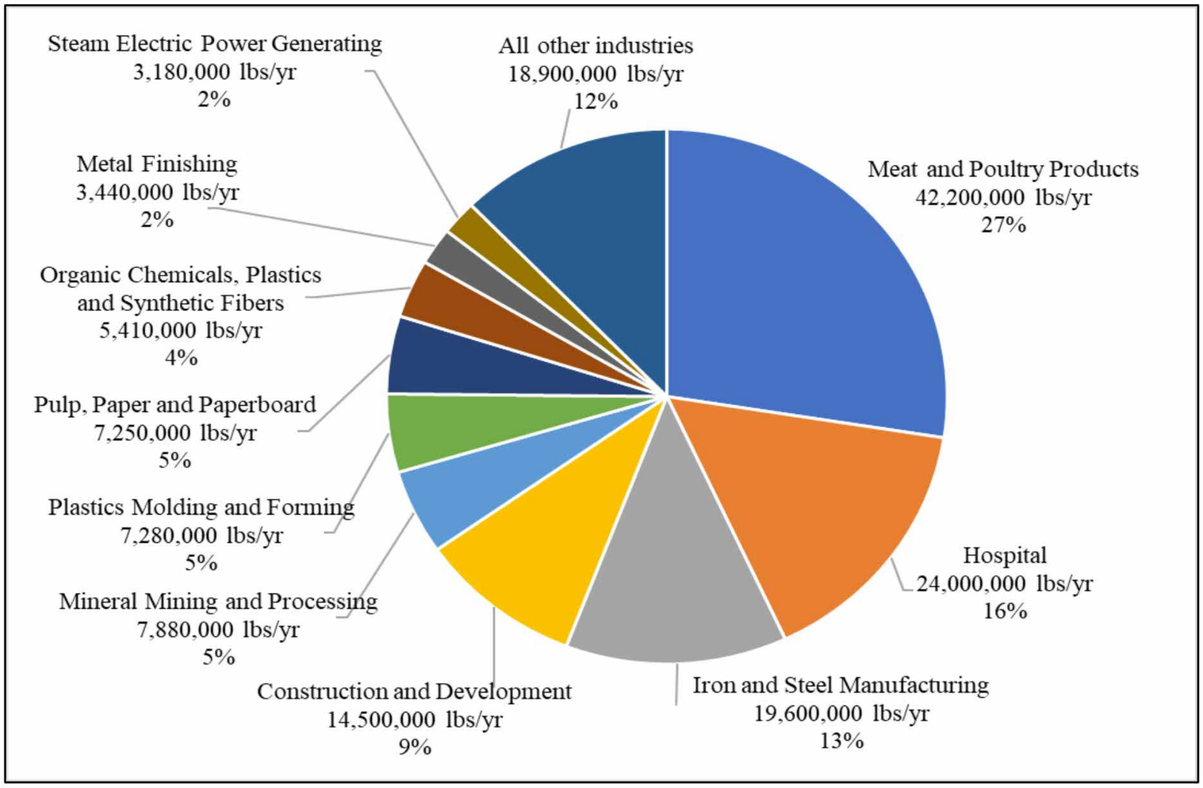

Figure 2-3. Top Ten PSCs Discharging Total Phosphorus

2.5 Assessing Industrial Discharges to Waters Impaired for Nutrients

As part of this cross-industry nutrients review, EPA began evaluating impaired waters data to identify PSCs potentially discharging nutrients to nutrient impaired waters. This analysis aims to provide additional context to the potential impact of nutrient discharges from prioritized PSCs. Table 2-2 summarizes the datasets used for this analysis.

Table 2-2. Data Sources Used for Nutrients Impaired Waters Analysis

Data Sources	Brief Description	Use in Impaired Waters Analysis
ICIS-NPDES	ICIS-NPDES is an information management system maintained by EPA's Office of Compliance to track permit compliance and enforcement status of facilities regulated by NPDES under the Clean Water Act (CWA). ICIS-NPDES contains permit and discharge monitoring information, including the location of facilities and outfalls.	EPA compiled a list of facility and outfall locations reported by all NPDES permitted facilities in 2017 and DMR discharge data reported in 2018.

Table 2-2. Data Sources Used for Nutrients Impaired Waters Analysis

Data Sources	Brief Description	Use in Impaired Waters Analysis
National Hydrography Dataset Plus (NHD Plus) (Version 2.1)	NHD Plus is a national geospatial surface water framework. It is a geospatial dataset that, among other things, contains shapefiles and attribute data for all hydrologic features in a given area. In the NHD Plus data, each body of water in the U.S is split into smaller subsections and assigned an identifying code called the Reach code.	EPA used the NHD dataset to associate the facility outfall (or facility location in the absence of specific outfall locations) to the nearest water body segment using the Reach code.
Assessment and Total Maximum Daily Load Tracking and Implementation System (ATTAINS)	ATTAINS is an online system for accessing information about the conditions in the nation's surface waters. The CWA requires states, territories, and authorized tribes (states for brevity) to monitor water pollution and report to EPA every two years on the waters they have evaluated. This process is called assessment. This information reported to EPA by states is available in ATTAINS. The public information is made available via ATTAINS web services, geospatial services, as well as through other EPA tools including "How's My Waterway", and "Envirofacts."	EPA used ATTAINS data to identify the impairment status and causes, if applicable, associated with Reach codes. For this analysis, EPA considered a water to be nutrient impaired if the impairment cause was one or more of the following: algal growth, ammonia, nutrients, or oxygen depletion.

EPA followed the steps below to identify the extent to which industrial categories are discharging nutrients to nutrient impaired waters:

1. EPA used the Geographic Information System (GIS) to map the location of each outfall at each facility (or facility location if outfall location was not available) discharging nutrients, as identified from the DMR data to the nearest Reach code from the NHD data within a maximum distance of 10 kilometers.[9]
2. EPA used the ATTAINS dataset to identify the impairment status and impairment causes, if applicable, associated with each Reach code.
3. EPA counted the number of facilities discharging nutrients where at least one outfall is likely discharging to waters impaired by algal growth, ammonia, nutrients, or oxygen depletion, as identified from the ATTAINS dataset. EPA then calculated the percent of facilities in each industry discharging to nutrient impaired waters.
4. From the 2018 DMR data, EPA summed all reported total nitrogen and total phosphorus loads for each PSC (see Section 2.3).
5. EPA calculated the reported total nitrogen and total phosphorus loads for facilities in each PSC that may be discharging to nutrient impaired waters.
6. EPA divided the load from facilities that may be discharging to nutrient impaired waters from step 5 by the total load discharged from each PSC from step 4 to calculate the percent

[9] If there was no flowline within the maximum distance of 10 kilometers, EPA did not include an associated Reach code for the facility.

of the PSC's total nitrogen and total phosphorus load that is likely discharged to nutrient impaired waters.

EPA has identified the following considerations regarding the analysis.

- For this analysis, if a facility's outfall location information was not available in ICIS-NPDES, EPA used the facility's location to determine the National Hydrography Dataset Plus (NHD Plus) reach that is closest to the facility. Thus, some discharge locations and receiving waters may be incorrectly identified, affecting the accuracy of estimated discharge loads into impaired waters.
- Although required to report impaired waters in ATTAINS every two years, the most recent reporting year varies by state. Some of the data are from as far back as 2002. Furthermore, many states do not fully monitor or assess all waters within their boundaries for impairments, results in incomplete data concerning waters impaired by nitrogen and phosphorus pollution in these states.
- ATTAINS data also do not include coastal regions and Great Lakes waterbodies.[10]

Appendix C present the preliminary results of the nutrient impaired waters analysis. After EPA prioritized the industrial categories for further review based on the nutrient rankings, EPA used the results of this analysis to provide additional context for the potential impact of the industrial discharges on nutrient impaired waters (see Section 3).

[10] See EPA's Waters Assessed as Impaired due to Nutrient-Related Causes for a more detailed discussion of this.

3. Prioritization of PSCs for Further Review from the Nutrient Discharge Rankings

In order to prioritize PSCs for further review, EPA reviewed PSCs whose summed total load (reported and estimated) makes up 95 percent of the total nitrogen and total phosphorous load, respectively, in 2018 across all PSCs. EPA did not review facilities from categories where the ELGs were promulgated or revised in the past seven years: Construction and Development (Revised March 6, 2014), Steam Electric Power Generating (Revised 2020), Oil and Gas Extraction (Revised June 2016), Dental Office (Promulgated June 14, 2017).

For the top PSCs, EPA reviewed the total load across the PSC to determine if the total load is widespread (i.e., the majority of the load is associated with multiple facilities). EPA did not prioritize PSCs that have high annual loads due to discharges from less than three facilities, which may not be representative of discharges across the category.

To provide context for the magnitude of the discharges and facilitate EPA's further prioritization of PSCs, EPA then compared the range of reported concentrations for each PSC to wastewater treatment levels associated with varying degrees of nutrient removal obtainable with current technology. The levels include no nutrient removal with effluent TN greater than 15 mg/L at Level 1 up to Level 5 with TN less than 2 mg/L (WERF, 2011, U.S. EPA, 2015). For this review, EPA compared 2018 DMR median and third quartile concentration value (i.e., 50 percent and 75 percent of facilities, respectively) to Level 2 (the least stringent treatment objective targeting nutrients) and Level 5 (the most stringent treatment objective targeting nutrients).Table 3-1 describes these treatment levels. Additionally, EPA compared PSC concentrations to nutrient levels achieved in POTWs using biological nutrient removal (BNR) processes. BNR levels of technology are the same as level 4, at 3 mg N/L and 0.1 mg P/L (Jeyanayagam, 2005).

Table 3-1. Water Environment Research Foundation (WERF) Nutrient Removal Methods and Treatment Objectives

Treatment Level	Nutrient Removal Mechanism	Treatment Objectives	
		Total Nitrogen	Total Phosphorous
Level 2	Nitrification/Denitrification and Biological Phosphorus Removal	8 mg/L	1 mg/L
Level 4	BNR, Nitrification/Denitrification and Biological Phosphorus Removal, High Rate Clarification and Denitrification Filtration	3 mg/L	0.1 mg/L
Level 5	Nitrification/Denitrification and Biological Phosphorus Removal, High Rate Clarification Denitrification Filtration, Microfiltration/Reverse Osmosis on about Half the Flow	< 2 mg/L	< 0.02 mg/L

Source: WERF, 2011

The following sections present the results of EPA's review based on the total nitrogen rankings (discussed in Section 3.1) and the total phosphorus rankings (discussed in Section 3.2). For the PSCs prioritized for each of the nutrient discharge rankings, EPA also reviewed the results of the nutrient impaired waters analysis (see Section 2.5 for the methodology of the nutrient impaired waters analysis).

3.1 Prioritizing Industries Based on Total Nitrogen Discharge Rankings

From the total nitrogen discharge rankings, 16 PSCs cumulatively make up 95 percent of the total load in 2018 as shown in Appendix B. Table 3-2 summarizes the total load, percent of the total load that is estimated, and the median and third quartile reported concentration value (i.e., 50 percent and 75 percent of facilities, respectively) for these PSCs as well as a discussion for EPA's rationale on whether to prioritize a category for further review. EPA first reviewed if the 2018 total load for each PSC was being driven by a few facilities as this would not be representative of the industry. If the 2018 total load appeared widespread, EPA compared the median and 75th percentile concentrations across the top PSCs.

For most of the PSCs with widespread discharges, at least 75 percent of facilities are reporting total nitrogen concentrations at or below 2 mg/L. However, some of the PSCs are discharging above 8 mg/L. Therefore, EPA prioritized PSCs with widespread discharges (i.e., not resulting from a few facilities with high loads), and concentrations above 8 mg/L. This level of nitrogen is commonly achieved by POTWs with biological nutrient removal (BNR) processes, and by any of EPA case study facilities (U.S. EPA, 2015). In these PSCs, at least 25 percent of facilities are discharging concentrations greater than what POTWs with BNR can achieve.

For this review, EPA is prioritizing the following PSCs for further review: Fertilizer Manufacturing (40 CFR Part 418) and Explosives Manufacturing (40 CFR Part 457).

Based on EPA's impaired waters analysis, one facility (or four percent of facilities) in the Explosives Manufacturing PSC is known to discharge to nutrient impaired waters, which accounts for 0.05 percent of the PSC's discharged total nitrogen load. Eight facilities (or 6.5 percent of facilities) in the Fertilizer Manufacturing PSC are known to discharge to nutrient impaired waters, which accounts for 13 percent of the PSC's discharged total nitrogen load. The results of the nutrient impaired waters analysis across all categories are provided in Appendix C.

Table 3-2. Prioritization of PSCs from Total Nitrogen Discharge Rankings

40 CFR Part	PSC Name	2018 Total Load (Reported and Estimated) (lb/yr)	Percentage of Total Load that is Estimated	Median and 75th Percentile of Reported Concentrations[a] (mg/L)	Rationale	Summary
450	Construction and Development	71,400,000	> 99%	Median: 3.27 mg/L 75th percentile: 13.1 mg/L	The ELGs for this PSC were revised March 6, 2014. Over 99 percent of the 2018 total nitrogen load is estimated data, attributed to a single facility (NPDES Permit Number KYR004203) that has an estimated load of 71,100,000 lb/yr). The 2018 total nitrogen load for this PSC (reported and estimated) without this facility would be 208,000 lb/yr, which drops this PSC from the roster of PSCs that account for 95 percent of the total nitrogen load across all PSCs. Based on the lack of widespread discharge of total nitrogen by this category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from the PSC.	Recently Reviewed; Not Prioritized at this Time
460	Hospital	66,100,000	< 1%	Median: 1.96 mg/L 75th percentile: 8.30 mg/L	Over 99 percent of the 2018 total nitrogen load is reported data, attributed to two facilities (NPDES Permit Numbers WVG550792 and MO0116122 that reported 54,400,000 lb/yr and 11,100,000 lb/yr, respectively). The 2018 total nitrogen load (reported plus estimated) without these facilities would be 585,000 lb/yr, which drops this PSC from the roster of PSCs that account for 95 percent of the total nitrogen load across all PSCs. Based on the lack of widespread discharge of total nitrogen by facilities in this category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from this PSC.	Not Prioritized at this Time

Table 3-2. Prioritization of PSCs from Total Nitrogen Discharge Rankings

40 CFR Part	PSC Name	2018 Total Load (Reported and Estimated) (lb/yr)	Percentage of Total Load that is Estimated	Median and 75th Percentile of Reported Concentrations[a] (mg/L)	Rationale	Summary
430	Pulp, Paper and Paperboard	44,900,000	44%	Median: 1.58 mg/L 75th percentile: 4.06 mg/L	EPA conducted a preliminary review of the Pulp, Paper, and Paperboard industry as part of its Preliminary Plan 14 (U.S. EPA, 2019a). EPA learned that in cases where nutrient concentrations in wastewater influent are deficient, facilities add supplemental forms of phosphorus and/or nitrogen to ensure effective biological treatment. This continues to be a source of nutrients in wastewater discharge from pulp and paper mills. From this prior review, EPA observed that the median nutrient concentrations in direct discharges from the industry based on 2015 DMR data are comparable to nutrient discharges achievable by POTWs that implement nutrient removal mechanisms in their wastewater treatment (U.S. EPA, 2019b). The 2018 reported DMR concentrations continue to support this observation as at least half the facilities reported concentrations (1.58 mg/L) below Level 5. Based on these findings, EPA intends to continue to review this category as additional information becomes available.	Recently Reviewed, Not Prioritized at this Time
454	Gum and Wood Chemicals Manufacturing	42,800,000	> 99%	Median: 0.175 mg/L 75th percentile: 0.300 mg/L	Over 99 percent of the 2018 total nitrogen load is estimated data, attributed to a single facility (NPDES Permit Number LAG490021) that has an estimated load of 42,800,000 lb/yr). The 2018 total nitrogen load (reported plus estimated) without this facility would be 28,400 lb/yr, which drops this PSC from the roster of PSCs that account for 95 percent of the total nitrogen load across all point source categories. Based on the lack of widespread discharge of total nitrogen by this category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from the PSC.	Not Prioritized at this Time

Table 3-2. Prioritization of PSCs from Total Nitrogen Discharge Rankings

40 CFR Part	PSC Name	2018 Total Load (Reported and Estimated) (lb/yr)	Percentage of Total Load that is Estimated	Median and 75th Percentile of Reported Concentrations[a] (mg/L)	Rationale	Summary
432	Meat and Poultry Products	39,200,000	12%	Median: 14.7 mg/L 75th percentile: 47.9 mg/L	EPA conducted a preliminary review of the Meat and Poultry Products industry as part of its Preliminary Plan 14 (U.S. EPA, 2019a). As announced in Plan 14 (U.S. EPA, 2020b), EPA intends to continue a detailed study of the industry.	Currently Under Review
N/A	Drinking Water Treatment	31,300,000	89%	Median: 0.113 mg/L 75th percentile: 1.03 mg/L	The 2018 total nitrogen load from this PSC appears to be distributed among facilities. The 75th percentile concentration value of reported data is 1.03 mg/L, which is lower than WERF Level 5. This indicates that the majority of facilities are already achieving discharges consistent with theoretical concentrations achieved by POTWs implementing more advanced nutrient removal. Based on the lower reported discharge concentrations in this category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from the PSC.	Not Prioritized at this Time
423	Steam Electric Power Generating	30,100,000	1%	Median: 0.0945 mg/L 75th percentile: 0.663 mg/L	EPA revised the Steam Electric Power Generating (40 CFR 423) 2015 rulemaking in 2020. Nitrogen discharges were part of the reconsideration.	Currently Under Review

Table 3-2. Prioritization of PSCs from Total Nitrogen Discharge Rankings

40 CFR Part	PSC Name	2018 Total Load (Reported and Estimated) (lb/yr)	Percentage of Total Load that is Estimated	Median and 75th Percentile of Reported Concentrations[a] (mg/L)	Rationale	Summary
457	Explosives Manufacturing	18,700,000	77%	Median: 6.34 mg/L 75th percentile: 13.4 mg/L	The total 2018 load is approximately 77 percent estimated data, attributed to single facility (NPDES Permit Number KY0097446) that has an estimated load of 14,400,000 lb/yr). The 2018 total nitrogen load (reported plus estimated) without this facility would be 4,230,000 lb/yr, which still maintains the PSC as a top discharger. At least 25 percent of the facilities in this PSC reported concentrations greater than POTWs employing limited nutrient removal can achieve (i.e., Level 2 concentration, 8 mg/L). Based on the widespread discharge of total nitrogen by this category and the reported concentrations, EPA is prioritizing this PSC for review at this time.	Prioritized for Further Review
414	Organic Chemicals, Plastics and Synthetic Fibers	14,100,000	44%	Median: 0.523 mg/L 75th percentile: 2.05 mg/L	The 2018 total nitrogen loads from this PSC appears to be distributed among facilities. The 75th percentile concentration value of reported data is 2.05 mg/L, which is close to Level 5 (<2 mg/L). This indicates that the majority of facilities are already achieving discharges consistent with concentrations achieved by POTWs implementing more advanced nutrient removal. Based on the lower reported discharge concentrations in this category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from the PSC.	Not Prioritized at this Time

Table 3-2. Prioritization of PSCs from Total Nitrogen Discharge Rankings

40 CFR Part	PSC Name	2018 Total Load (Reported and Estimated) (lb/yr)	Percentage of Total Load that is Estimated	Median and 75th Percentile of Reported Concentrations[a] (mg/L)	Rationale	Summary
433	Metal Finishing	10,600,000	79%	Median: 0.264 mg/L 75th percentile: 1.53 mg/L	The 2018 total nitrogen loads from this PSC appears to be distributed among facilities. The 75th percentile concentration value of reported data is 1.53 mg/L, which is lower than Level 5 (<2 mg/L). This indicates that the majority of facilities are already achieving discharges consistent with concentrations achieved by POTWs implementing more advanced nutrient removal. Based on the lower reported discharge concentrations in this category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from the PSC.	Not Prioritized at this Time
418	Fertilizer Manufacturing	6,930,000	10%	Median: 6.12 mg/L 75th percentile: 37.5 mg/L	The total 2018 load is approximately 90 percent reported data and 10 percent estimated data and appears to be distributed among facilities. At least 25 percent of the facilities in this PSC reported concentrations greater than the level that POTWs employing limited nutrient removal can achieve (i.e., Level 2 concentration 8 mg/L). Based on the widespread discharge of total nitrogen by this category and the reported concentrations, EPA is prioritizing this PSC for review at this time.	Prioritized for Further Review

Table 3-2. Prioritization of PSCs from Total Nitrogen Discharge Rankings

40 CFR Part	PSC Name	2018 Total Load (Reported and Estimated) (lb/yr)	Percentage of Total Load that is Estimated	Median and 75th Percentile of Reported Concentrations[a] (mg/L)	Rationale	Summary
463	Plastics Molding and Forming	6,300,000	> 99%	Median: 0.273 mg/L 75th percentile: 0.876 mg/L	Over 99 percent of the total load is estimated, and the estimated load appears to be distributed among facilities. The 75th percentile concentration value of reported data is 0.876 mg/L, which is lower than Level 5 (<2 mg/L). This indicates that the majority of facilities are already achieving discharges consistent with concentrations achieved by POTWs implementing more advanced nutrient removal. Based on the lower reported discharge concentrations in this category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from the PSC.	Not Prioritized at this Time
415	Inorganic Chemicals Manufacturing	4,720,000	54%	Median: 0.549 mg/L 75th percentile: 1.99 mg/L	The 2018 total nitrogen loads from this PSC appears to be distributed among facilities. The 75th percentile concentration value of reported data is 1.99 mg/L, which is lower than Level 5 (<2 mg/L). This indicates that the majority of facilities are already achieving discharges consistent with concentrations achieved by POTWs implementing more advanced nutrient removal. Based on the lower reported discharge concentrations in this category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from the PSC.	Not Prioritized at this Time

Table 3-2. Prioritization of PSCs from Total Nitrogen Discharge Rankings

40 CFR Part	PSC Name	2018 Total Load (Reported and Estimated) (lb/yr)	Percentage of Total Load that is Estimated	Median and 75th Percentile of Reported Concentrations[a] (mg/L)	Rationale	Summary
420	Iron and Steel Manufacturing	4,700,000	12%	Median: 0.251 mg/L 75th percentile: 1.69 mg/L	The 2018 total nitrogen loads from this PSC appears to be distributed among facilities. The 75th percentile concentration value of reported data is 1.69 mg/L, which is lower than Level 5 (<2 mg/L). This indicates that the majority of facilities are already achieving discharges consistent with concentrations achieved by POTWs implementing more advanced nutrient removal. Based on the lower reported discharge concentrations in this category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from the PSC.	Not Prioritized at this Time
419	Petroleum Refining	3,750,000	9%	Median: 0.223 mg/L 75th percentile: 1.14 mg/L	EPA concluded a detailed study of the Petroleum Refining PSC as part of its Preliminary Plan 14 (U.S. EPA, 2019a). The 75th percentile concentration value of reported data is 1.14 mg/L, which is lower than Level 5 (<2 mg/L). This indicates that the majority of facilities are already achieving discharges consistent with concentrations achieved by POTWs implementing more advanced nutrient removal. Based on the lower reported discharge concentrations and the recent review, which included an evaluation of nutrients discharged by the Petroleum Refining category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from the PSC.	Recently Reviewed

Table 3-2. Prioritization of PSCs from Total Nitrogen Discharge Rankings

40 CFR Part	PSC Name	2018 Total Load (Reported and Estimated) (lb/yr)	Percentage of Total Load that is Estimated	Median and 75th Percentile of Reported Concentrations[a] (mg/L)	Rationale	Summary
436	Mineral Mining and Processing	3,220,000	53%	Median: 0.566 mg/L 75th percentile: 2.05 mg/L	The 2018 total nitrogen loads from this PSC appears to be distributed among facilities. The 75th percentile concentration value of reported data is 2.05 mg/L, which is close to Level 5 (<2 mg/L). This indicates that the majority of facilities are already achieving discharges consistent with concentrations achieved by POTWs implementing more advanced nutrient removal. Based on the lower reported discharge concentrations in this category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from the PSC.	Not Prioritized at this Time

Source: ERG, 2020a

N/A: Not applicable, category is not currently subject to limitations in the national ELGs.

Note: All discharge values are rounded to three significant figures.

[a] The calculation for this value includes concentrations greater than or equal to zero.

3.2 Prioritizing Industries Based on Total Phosphorus Discharge Rankings

From the total phosphorus discharge rankings, 15 PSCs cumulatively make up 95 percent of the total load in 2018 as shown in Appendix B. Table 3-3 summarizes the total load, percent of the total load that is estimated, and the median and third quartile of the reported concentration values (i.e., the concentrations at which 50 percent and 75 percent of all facilities discharge phosphorus in concentrations lower than the 50th and 75th percentile concentrations). The table also summarizes EPA's rationale for prioritizing – or not prioritizing – a category for further review.

EPA first reviewed if the 2018 total load for each PSC was being driven by a few facilities, which would not be representative of the industry. If the 2018 total load appeared widespread, EPA compared the median and 75th percentile concentrations across the top PSCs. All top PSCs had the third quartile concentrations above Level 5 for total phosphorus (<0.02 mg/L), indicating that very few facilities in the top PSCs may be implementing advanced phosphorus removal. Therefore, EPA prioritized PSCs where the total phosphorus discharges appear widespread among the PSC's facilities and the 75th percentile concentration value is greater than Level 2 for total phosphorus (1 mg/L).

From this review, EPA is currently prioritizing the following PSCs for further review: Plastics Molding and Forming (40 CFR Part 463) and Miscellaneous Foods and Beverages (no current ELGs).

Based on EPA's impaired waters analysis, 32 facilities (or 13 percent of facilities) in the Plastics Molding and Forming PSC discharged to nutrient impaired waters, which accounts for 32 percent of the PSC's total phosphorus load discharged. Eighteen facilities (or 7.2 percent of facilities) in the Miscellaneous Foods and Beverages industry discharged to nutrients impaired waters, which accounts for one percent of the PSC's total phosphorus load discharged. The results of the nutrients impaired waters analysis across all categories are provided in Appendix C.

Table 3-3. Prioritization of PSCs from Total Phosphorus Discharge Rankings

40 CFR Part	PSC Name	2018 Total Load (Reported and Estimated) (lb/yr)	Percentage of Total Load that is Estimated	Median and 75th Percentile of Reported Concentrations[a] (mg/L)	Rationale	Summary
432	Meat and Poultry Products	42,200,000	81%	Median: 1.18 mg/L 75th percentile: 10.6 mg/L	EPA conducted a preliminary review of the Meat and Poultry Products industry as part of its Preliminary Plan 14 (U.S. EPA, 2019a). As announced in Plan 14 (U.S. EPA, 2020b), EPA intends to continue a detailed study of the industry.	Currently Under Review
460	Hospital	24,000,000	> 99%	Median: 1.47 mg/L 75th percentile: 2.61 mg/L	Over 99 percent of the 2018 total phosphorus load is estimated data, attributed to three facilities (NPDES Permit Numbers WVG550792, MO0116122, and MO0099953 that reported 14,400,000 lb/yr, 6,990,000 lb/yr, and 2,520,000 lb/yr, respectively). The 2018 total phosphorus load (reported plus estimated) without these facilities would be 81,300 lb/yr. This drops this PSC from the roster of PSCs that account for 95 percent of the total phosphorus load across all PSCs. Based on the lack of widespread discharge of total phosphorus by this category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from the PSC.	Not Prioritized at this Time

Table 3-3. Prioritization of PSCs from Total Phosphorus Discharge Rankings

40 CFR Part	PSC Name	2018 Total Load (Reported and Estimated) (lb/yr)	Percentage of Total Load that is Estimated	Median and 75th Percentile of Reported Concentrations[a] (mg/L)	Rationale	Summary
420	Iron and Steel Manufacturing	19,600,000	> 99%	Median: 0.0708 mg/L 75th percentile: 0.204 mg/L	Over 99 percent of the 2018 total phosphorus load is estimated data, attributed to two facilities. (NPDES Permit Numbers IN0000337 and PA0223034) that reported 11,700,000 lb/yr and 6,880,000 lb/yr, respectively. The 2018 total phosphorus load (reported plus estimated) without these facilities would be 1,050,000 lb/yr, which would still maintain the PSC as a top discharger. The remaining 2018 total phosphorus load from this PSC appears to be distributed among facilities. The 75th percentile concentration value of reported data is 0.204 mg/L, which is below Level 2 (1 mg/L). This indicates that the majority of facilities are already achieving discharges consistent with concentrations achieved by POTWs implementing at least some level of phosphorus removal. Based on the lower reported discharge concentrations in this category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from the PSC.	Not Prioritized at this Time

Table 3-3. Prioritization of PSCs from Total Phosphorus Discharge Rankings

40 CFR Part	PSC Name	2018 Total Load (Reported and Estimated) (lb/yr)	Percentage of Total Load that is Estimated	Median and 75th Percentile of Reported Concentrations[a] (mg/L)	Rationale	Summary
450	Construction and Development	14,500,000	> 99%	Median: 0.550 mg/L 75th percentile: 2.67 mg/L	The ELGs for this PSC were recently revised March 6, 2014. Over 99 percent of the 2018 total phosphorus load is estimated data attributed to a single facility (NPDES Permit Number KYR004203) that has an estimated load of 14,500,000 lb/yr. The 2018 total phosphorus load (reported plus estimated) without this facility would be 23,300 lb/yr. This drops this PSC from the roster of PSCs that account for 95 percent of the total phosphorus load across all PSCs. Based on the lack of widespread discharge of total phosphorus by this category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from the PSC.	Recently Reviewed; Not Prioritized at this Time

Table 3-3. Prioritization of PSCs from Total Phosphorus Discharge Rankings

40 CFR Part	PSC Name	2018 Total Load (Reported and Estimated) (lb/yr)	Percentage of Total Load that is Estimated	Median and 75th Percentile of Reported Concentrations[a] (mg/L)	Rationale	Summary
436	Mineral Mining and Processing	7,880,000	85%	Median: 0.0471 mg/L 75th percentile: 0.380 mg/L	Approximately 85 percent of the 2018 total phosphorus load is estimated data, attributed to two facilities (NPDES Permit Numbers TN0077739 and OH0041122 that reported 3,500,000 lb/yr and 2,980,000 lb/yr, respectively). The 2018 total phosphorus load (reported plus estimated) without these facilities would be 1,390,000 lb/yr, which would still maintain the PSC as a top discharger. The remaining 2018 total phosphorus load from this PSC appears to be distributed among the other facilities. The 75th percentile concentration value of reported data is 0.380 mg/L, which is below Level 2 (1 mg/L). This indicates that the majority of facilities are already achieving discharges consistent with concentrations achieved by POTWs implementing at least some level of phosphorus removal. Based on the lower reported discharge concentrations in this category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from the PSC.	Not Prioritized at this Time

Table 3-3. Prioritization of PSCs from Total Phosphorus Discharge Rankings

40 CFR Part	PSC Name	2018 Total Load (Reported and Estimated) (lb/yr)	Percentage of Total Load that is Estimated	Median and 75th Percentile of Reported Concentrations[a] (mg/L)	Rationale	Summary
463	Plastics Molding and Forming	7,280,000	> 99%	Median: 0.333 mg/L 75th percentile: 1.72 mg/L	Over 99 percent of the total 2018 load is estimated and the estimated load appears to be distributed among facilities. The 75th percentile concentration (1.72 mg/L), one of the highest concentrations for the top categories, is larger than Level 2. This indicates that at least 25 percent of the facilities discharge concentrations greater than POTWs employing limited nutrient removal can achieve (i.e., WERF Level 2 concentration 1 mg/L). The estimated load suggests that total phosphorous discharges reported by this PSC may be substantially underreported. Further, many facilities reporting total phosphorous discharges in this category report concentrations that are well above the theoretical nutrient concentrations achieved by POTWs employing limited nutrient treatment. Therefore, EPA is prioritizing this PSC for review at this time.	Prioritized for Further Review

Table 3-3. Prioritization of PSCs from Total Phosphorus Discharge Rankings

40 CFR Part	PSC Name	2018 Total Load (Reported and Estimated) (lb/yr)	Percentage of Total Load that is Estimated	Median and 75th Percentile of Reported Concentrations[a] (mg/L)	Rationale	Summary
430	Pulp, Paper and Paperboard	7,250,000	42%	Median: 0.329 mg/L 75th percentile: 0.694 mg/L	EPA conducted a preliminary review of the Pulp, Paper, and Paperboard industry as part of its Preliminary Plan 14 (U.S. EPA, 2019a). EPA learned that in cases where nutrient concentrations in wastewater influent are deficient, facilities add supplemental forms of phosphorus and/or nitrogen to ensure effective biological treatment. This continues to be a source of nutrients in wastewater discharge from pulp and paper mills. From this review, EPA observed the median nutrient concentrations in direct discharges from the industry based on 2015 DMR data are comparable to nutrient discharges achievable by POTWs that implement nutrient removal mechanisms in their wastewater treatment (U.S. EPA, 2019b). The 2018 reported DMR concentrations continue to support this observation as at least 75 percent of the facilities are reporting concentrations (0.694 mg/L) below the Level 2. Based on these findings, EPA intends to continue to review this category as additional information becomes available.	Recently Reviewed, Not Prioritized at this Time
414	Organic Chemicals, Plastics and Synthetic Fibers	5,410,000	71%	Median: 0.164 mg/L 75th percentile: 0.546 mg/L	The 2018 total phosphorus loads from this PSC appears to be distributed among facilities. The 75th percentile concentration value of reported data is 0.546 mg/L, which is below Level 2 (1 mg/L). This indicates that the majority of facilities are already achieving discharges consistent with concentrations achieved by POTWs implementing at least some level of phosphorus removal. Based on the lower reported discharge concentrations in this category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from the PSC.	Not Prioritized at this Time

Table 3-3. Prioritization of PSCs from Total Phosphorus Discharge Rankings

40 CFR Part	PSC Name	2018 Total Load (Reported and Estimated) (lb/yr)	Percentage of Total Load that is Estimated	Median and 75th Percentile of Reported Concentrations[a] (mg/L)	Rationale	Summary
433	Metal Finishing	3,440,000	97%	Median: 0.0706 mg/L 75th percentile: 0.762 mg/L	Approximately 97 percent of the total 2018 load is estimated and the estimated load appears to be distributed among facilities. The 75th percentile concentration value of reported data is 0.762 mg/L, which is below Level 2 (1 mg/L). This indicates that the majority of facilities are already achieving discharges consistent with concentrations achieved by POTWs implementing at least some level of phosphorus removal. Based on the lower reported discharge concentrations in this category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from the PSC.	Not Prioritized at this Time
423	Steam Electric Power Generating	3,180,000	31%	Median: 0.0371 mg/L 75th percentile: 0.340 mg/L	EPA revised the Steam Electric Power Generating (40 CFR 423) 2015 rulemaking in 2020. Nitrogen discharges were part of the reconsideration.	Currently Under Review
418	Fertilizer Manufacturing	3,020,000	< 1%	Median: 0.405 mg/L 75th percentile: 2.26 mg/L	The total 2018 load is over 99 percent reported data, attributed to two facilities (NPDES Permit Numbers LA0004847 and LA0029769) that reported 2,060,000 lb/yr and 873,000 lb/yr, respectively. The 2018 total phosphorus load (reported plus estimated) without these facilities would be 92,500 lb/yr. This drops this PSC from the roster of PSCs that account for 95 percent of the total phosphorus load across all PSCs. Based on the lack of widespread discharge of total phosphorus by this category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from the PSC.	Not Prioritized at this Time

Table 3-3. Prioritization of PSCs from Total Phosphorus Discharge Rankings

40 CFR Part	PSC Name	2018 Total Load (Reported and Estimated) (lb/yr)	Percentage of Total Load that is Estimated	Median and 75th Percentile of Reported Concentrations[a] (mg/L)	Rationale	Summary
454	Gum and Wood Chemicals Manufacturing	2,840,000	> 99%	Median: 0.730 mg/L 75th percentile: 1.42 mg/L	Over 99 percent of the 2018 total phosphorus load is estimated data (2,820,000 lb/yr), attributed to a single facility (NPDES Permit Number LAG490021) that has an estimated load of 2,810,000 lb/yr. The 2018 total phosphorus load (reported plus estimated) without this facility would be 26,300 lb/yr. This drops this PSC from the roster of PSCs that account for 95 percent of the total phosphorus load across all PSCs. Based on the lack of widespread discharge of total phosphorus by this category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from this PSC.	Not Prioritized at this Time
N/A	Miscellaneous Foods and Beverages	2,440,000	74%	Median: 0.436 mg/L 75th percentile: 1.42 mg/L	The total 2018 load is attributed to both reported and estimated data and the load appears to be distributed among the facilities in the category. The 75th percentile concentration of reported data is 1.42 mg/L, above Level 2 (1 mg/L). This indicates that at least 25 of the facilities discharge concentrations greater than POTWs employing limited nutrient removal can achieve. The analysis suggests that total phosphorous discharges reported by this PSC are widespread and may be underreported. Further, many facilities reporting total phosphorous discharges in this category report concentrations that are well above the nutrient concentrations achieved by POTWs employing some level nutrient removal. Therefore, EPA is prioritizing this PSC for review at this time.	Prioritized for Further Review

Table 3-3. Prioritization of PSCs from Total Phosphorus Discharge Rankings

40 CFR Part	PSC Name	2018 Total Load (Reported and Estimated) (lb/yr)	Percentage of Total Load that is Estimated	Median and 75th Percentile of Reported Concentrations[a] (mg/L)	Rationale	Summary
419	Petroleum Refining	1,970,000	86%	Median: 0.0937 mg/L 75th percentile: 0.261 mg/L	EPA concluded a detailed study of the Petroleum Refining point source category as part of its Preliminary Plan 14 (U.S. EPA, 2019a). The 75th percentile concentration value of reported data is 0.261 mg/L, which is below Level 2 (1 mg/L). This indicates that the majority of facilities are already achieving discharges consistent with concentrations achieved by POTWs implementing at least some level of phosphorus removal. Based on these findings, EPA intends to continue to review this category as additional information becomes available.	Recently Reviewed
N/A	Drinking Water Treatment	1,310,000	83%	Median: 0.0430 mg/L 75th percentile: 0.204 mg/L	Over 99 percent of the total 2018 load is estimated and the estimated load appears to be distributed among facilities. The 75th percentile concentration value of reported data is 0.204 mg/L, which is below Level 2 (1 mg/L). This indicates that the majority of facilities are already achieving discharges consistent with concentrations achieved by POTWs implementing at least some level of phosphorus removal. Based on the lower reported discharge concentrations in this category, EPA is not prioritizing this PSC for review at this time but will continue to monitor wastewater discharges from the PSC.	Not Prioritized at this Time

Source: ERG, 2020b
N/A: Not applicable, category is not currently subject to limitations in the national ELGs.
Note: All discharge values are rounded to three significant figures.
[a] The calculation for this value includes concentrations greater than or equal to zero.

4. References

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Appendix A
Manual Corrections to the 2018 DMR Dataset

Table A-1. Manual Corrections Made to the 2018 DMR Data

NPDES Permit	Facility Name and Location	Industry	Aggregated Parameter	Original 2018 Load (lb/yr)	Updated 2018 Load (lb/yr)	Identified Outliers and Manual Corrections
CA0063401	Edward C. Little WRP El Segundo, CA	Drinking Water Treatment	Total Nitrogen	2,154,303.50	2,293,235	After EPA downloaded data for the nutrient discharge rankings analysis from ICIS-NPDES, the facility updated the ammonia as N load from outfall 001. Based on this change, EPA updated the 2018 aggregated total nitrogen load for this facility.
FL0041556[a]	Anheuser-Busch Nutri-Turf Sod Farm Jacksonville, FL	Miscellaneous Foods and Beverages	Total Nitrogen	1,686,439.14	10,265.58	EPA identified the average daily flow reported on December 31, 2018, to be 1,000 times larger than other monitoring periods. This flow value is used to calculate the load for both aggregated total nitrogen and total phosphorus. EPA divided the average daily flow reported on December 31, 2018, by 1,000 and recalculated the 2018 aggregated total nitrogen and total phosphorus loads.
			Total Phosphorus	4,672,729.37	16,691.71	
GA0000426	Dow Chemical Co. Dalton Plant Dalton, GA	Rubber Manufacturing	Total Nitrogen	20,415,234.21	21,407.20	EPA identified the average daily flow reported on July 31, 2018, to be 1,000 times larger than other monitoring periods. This flow value is used to calculate the load for both aggregated total nitrogen and total phosphorus. EPA divided the average daily flow reported on July 31, 2018 by 1,000 and recalculated the 2018 aggregated total nitrogen and total phosphorus loads.
			Total Phosphorus	33,623.26	299.68	
MO0099953[a]	Mary's Ranch WWTF Marble Hill, MO	Hospital	Total Nitrogen	2,034,582.37	9,277.48	EPA identified the average daily flow reported on March 31, 2018 and June 30, 2018 to be 1,000 and 100 times larger, respectively, than other monitoring periods. This flow value is used to calculate the load for aggregated total nitrogen. EPA divided the average daily flow reported on March 31, 2018, and June 30, 2018 by 1,000 and 100, respectively, and recalculated the 2018 aggregated total nitrogen load.

Table A-1. Manual Corrections Made to the 2018 DMR Data

NPDES Permit	Facility Name and Location	Industry	Aggregated Parameter	Original 2018 Load (lb/yr)	Updated 2018 Load (lb/yr)	Identified Outliers and Manual Corrections
MO0133558[a]	Bulldog's Beach House WWTP Camdenton, MO	Grain Mills	Total Nitrogen	1,298,435.38	21.33	EPA identified the average daily flow reported on June 30, 2018, and July 31, 2018, to be 100,000 times larger than other monitoring periods. This flow value is used to calculate the load for aggregated total nitrogen. EPA divided the average daily flow reported on June 30, 2018, and July 31, 2018, by 100,000 and recalculated the 2018 aggregated total nitrogen load.
PA0027715	Max Environmental Yukon Facility Yukon, PA	Centralized Waste Treatment	Total Nitrogen	644,429.13	4,178.10	EPA identified the average daily flow reported on June 30, 2018, to be 1,000 times larger than other monitoring periods. This flow value is used to calculate the load for aggregated total nitrogen. EPA divided the average daily flow reported on June 30, 2018, by 1,000 and recalculated the 2018 aggregated total nitrogen load.
WVG550875	Danser, Inc. Parkersburg, WV	Metal Finishing	Total Nitrogen	9,790,424.04	42,660.19	EPA identified the average daily flow reported on September 30, 2018, and December 31, 2018, to be 1,000 times larger than other monitoring periods. This flow value is used to calculate the load for aggregated total nitrogen. EPA divided the average daily flow reported on September 30, 2018, and December 31, 2018, by 1,000 and recalculated the 2018 aggregated total nitrogen load.

Source: ERG, 2020c

[a] IECP has confirmed and corrected the errors identified for these facilities (i.e., FL0041556, MO0099953, and MO0133558).

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Appendix B
Nutrient Discharge Rankings Based on 2018 DMR Data

Table B-1. Total Nitrogen Discharge Ranking Results Based on 2018 DMR Data

40 CFR Part	PSC Name	Cumulative Percent of Total Load	2018 Total Load (Reported and Estimated) (lb/yr)	2018 Reported Total Nitrogen Load (lb/yr)	2018 Estimated Total Nitrogen Load (lb/yr)	Percent of Total Load that is Estimated	Median Facility Load (Reported and Estimated) (lb/yr)	Reported Concentrations (mg/L)			Number of Facilities with a Reported TN Load[a]	Number of Facilities with an Estimated TN Load[a]	Number of Facilities in the Dataset
								25th Percentile	Median – 50th Percentile	75th Percentile			
450	Construction and development	17%	71,400,000	34,400	71,300,000	> 99%	68.3	0.371	3.27	13.1	85	81	830
460	Hospital	33%	66,100,000	66,100,000	11,600	< 1%	24	0.398	1.96	8.3	172	62	271
430	Pulp, paper and paperboard	43%	44,900,000	25,100,000	19,900,000	44%	39,000	0.169	1.58	4.06	116	106	303
454	Gum and wood chemicals manufacturing	54%	42,800,000	26,900	42,800,000	> 99%	94.7	0.0470	0.175	0.300	5	8	21
432	Meat and poultry products	63%	39,200,000	34,600,000	4,660,000	12%	10,900	1.35	14.7	47.9	364	42	467
N/A	Drinking water treatment	70%	31,300,000	3,410,000	27,800,000	89%	22.7	0	0.113	1.03	330	1,512	2,568
423	Steam electric power generating	78%	30,100,000	29,800,000	292,000	1%	1,010	0	0.0945	0.663	295	42	1,122
457	Explosives manufacturing	82%	18,700,000	4,220,000	14,400,000	77%	7,160	0.586	6.34	13.4	17	5	25
414	Organic chemicals, plastics and synthetic fibers	85%	14,100,000	7,870,000	6,270,000	44%	783	0.101	0.523	2.05	334	294	757
433	Metal finishing	88%	10,600,000	2,200,000	8,370,000	79%	79.2	0.00304	0.264	1.53	807	401	2,349
418	Fertilizer manufacturing	90%	6,930,000	6,270,000	663,000	10%	5,240	1.42	6.12	37.5	83	14	123
463	Plastics molding and forming	91%	6,300,000	14,400	6,290,000	> 99%	84.5	0.0475	0.273	0.876	35	72	247
415	Inorganic chemicals manufacturing	92%	4,720,000	2,180,000	2,540,000	54%	1230	0.104	0.549	1.99	152	78	310
420	Iron and steel manufacturing	93%	4,700,000	4,130,000	565,000	12%	894	0.0465	0.251	1.69	68	77	195
419	Petroleum refining	94%	3,750,000	3,390,000	355,000	9%	2770	0	0.223	1.14	195	50	1,335

Table B-1. Total Nitrogen Discharge Ranking Results Based on 2018 DMR Data

40 CFR Part	PSC Name	Cumulative Percent of Total Load	2018 Total Load (Reported and Estimated) (lb/yr)	2018 Reported Total Nitrogen Load (lb/yr)	2018 Estimated Total Nitrogen Load (lb/yr)	Percent of Total Load that is Estimated	Median Facility Load (Reported and Estimated) (lb/yr)	Reported Concentrations (mg/L)			Number of Facilities with a Reported TN Load[a]	Number of Facilities with an Estimated TN Load[a]	Number of Facilities in the Dataset
								25th Percentile	Median – 50th Percentile	75th Percentile			
436	Mineral mining and processing	95%	3,220,000	1,520,000	1,690,000	53%	551	0.0249	0.566	2.05	487	229	3,734
451	Concentrated aquatic animal production	96%	2,370,000	1,550,000	813,000	34%	2790	0.0499	0.254	0.946	185	136	368
N/A	Miscellaneous foods and beverages	96%	1,840,000	918,000	922,000	50%	220	0.0251	0.828	3.44	107	71	249
408	Canned and preserved seafood processing	97%	1,700,000	1,110,000	597,000	35%	282	0.312	2.86	25	45	28	159
N/A	Food service establishments	97%	1,490,000	1,490,000	460	< 1%	3.41	0.195	0.968	5.07	149	53	241
429	Timber products processing	97%	1,480,000	1,330,000	151,000	10%	107	0.0568	0.23	1.27	112	154	882
439	Pharmaceutical manufacturing	98%	1,360,000	323,000	1,040,000	76%	633	0.214	0.611	1.8	39	22	113
409	Sugar processing	98%	1,350,000	1,190,000	161,000	12%	22100	0.305	6.2	12.9	21	7	34
440	Ore mining and dressing	98%	1,130,000	418,000	713,000	63%	4860	0.00366	0.447	2	60	41	206
406	Grain mills	99%	1,100,000	250,000	853,000	77%	5340	0.0467	1.73	9.61	40	12	71
445	Landfills	99%	1,010,000	989,000	24,000	2%	111	0.0365	0.279	1.57	218	68	403
410	Textile mills	99%	1,000,000	420,000	580,000	58%	1180	0.367	1.89	4.2	45	14	103
422	Phosphate manufacturing	99%	681,000	458,000	223,000	33%	21100	0.918	1.04	3.12	20	1	22
N/A	Unassigned waste facility	99%	601,000	575,000	25,200	4%	94.9	0.0706	0.416	2.32	210	64	504
407	Canned and preserved fruits and vegetables processing	99%	547,000	475,000	71,900	13%	780	0.0966	0.507	3.61	59	26	109

Table B-1. Total Nitrogen Discharge Ranking Results Based on 2018 DMR Data

40 CFR Part	PSC Name	Cumulative Percent of Total Load	2018 Total Load (Reported and Estimated) (lb/yr)	2018 Reported Total Nitrogen Load (lb/yr)	2018 Estimated Total Nitrogen Load (lb/yr)	Percent of Total Load that is Estimated	Median Facility Load (Reported and Estimated) (lb/yr)	Reported Concentrations (mg/L) 25th Percentile	Reported Concentrations (mg/L) Median – 50th Percentile	Reported Concentrations (mg/L) 75th Percentile	Number of Facilities with a Reported TN Load[a]	Number of Facilities with an Estimated TN Load[a]	Number of Facilities in the Dataset
405	Dairy products processing	99%	472,000	401,000	70,900	15%	500	0.269	0.984	4.89	85	39	144
449	Airport deicing	99%	470,000	415,000	55,400	12%	325	0	0.151	0.603	147	30	245
421	Nonferrous metals manufacturing	100%	287,000	258,000	28,900	10%	275	0.018	0.14	1.43	44	27	95
434	Coal mining	100%	280,000	255,000	25,600	9%	69.1	0	0	0.0109	173	11	2,872
411	Cement manufacturing	100%	276,000	276,000	-	-	93	0.00212	0.428	1.24	64	-	2,163
467	Aluminum forming	100%	232,000	44,200	188,000	81%	5,430	0.776	1.32	5.2	10	10	36
442	Transportation equipment cleaning	100%	229,000	78,000	151,000	66%	44	0.17	0.851	4.24	56	101	233
455	Pesticide chemicals	100%	226,000	142,000	83,600	37%	218	0.00212	0.179	0.962	19	7	28
443	Paving and roofing materials (tars and asphalt)	100%	213,000	51,300	162,000	76%	37	0	0.33	0.692	44	97	727
428	Rubber manufacturing	100%	141,000	81,500	59,700	42%	205	0.0145	0.235	0.84	32	41	136
437	Centralized waste treatment	100%	51,100	47,600	3,440	7%	560	0.0931	0.174	1.54	11	6	19
435	Oil & gas extraction	100%	50,100	30,900	19,200	38%	0.401	0	0.0837	1.36	76	106	1,586
464	Metal molding and casting (foundries)	100%	49,000	12,200	36,800	75%	114	0.00292	0.187	0.827	40	23	139
412	Concentrated animal feeding operations (CAFO)	100%	44,800	44,800	-	-	23.7	0.165	0.85	2.97	172	-	185

Table B-1. Total Nitrogen Discharge Ranking Results Based on 2018 DMR Data

40 CFR Part	PSC Name	Cumulative Percent of Total Load	2018 Total Load (Reported and Estimated) (lb/yr)	2018 Reported Total Nitrogen Load (lb/yr)	2018 Estimated Total Nitrogen Load (lb/yr)	Percent of Total Load that is Estimated	Median Facility Load (Reported and Estimated) (lb/yr)	Reported Concentrations (mg/L) 25th Percentile	Median – 50th Percentile	75th Percentile	Number of Facilities with a Reported TN Load[a]	Number of Facilities with an Estimated TN Load[a]	Number of Facilities in the Dataset
417	Soap and detergent manufacturing	100%	43,700	1,920	41,800	96%	938	0.000189	1.1	1.21	18	10	33
426	Glass manufacturing	100%	42,500	35,900	6,620	16%	163	0	0.796	1.52	19	13	76
N/A	Printing & publishing	100%	38,500	401	38,100	99%	227	0.0785	0.0986	20.9	6	2	34
425	Leather tanning and finishing	100%	27,200	27,200	-	-	1,650	3.91	4.02	42	4	-	4
471	Nonferrous metals forming and metal powders	100%	12,200	6,940	5,250	43%	57.9	0.00372	0.0608	0.829	42	18	104
446	Paint formulating	100%	6,080	80	6,000	99%	6.11	0.0594	0.119	0.63	14	16	50
444	Waste combustors	100%	5,890	5,160	731	12%	338	0.126	0.393	0.515	5	4	9
468	Copper forming	100%	2,620	67	2,560	97%	36.7	0.0531	0.106	0.246	4	9	19
N/A	Independent and standalone labs	100%	2,170	1,470	706	32%	83.7	0.0282	0.0841	0.481	19	4	47
N/A	Tobacco products	100%	1,700	1,700	-	-	850	0.330	0.469	0.608	3	-	4
465	Coil coating	100%	1,180	1,180	-	-	1,180	77.7	77.7	77.7	15	-	19
424	Ferroalloy manufacturing	100%	231	231	-	-	8.47	0.000230	0.0206	0.0642	6	-	11
447	Ink formulating	100%	0	0	-	-	0	0	0	0	1	-	11
458	Carbon black manufacturing	100%	0	0	-	-	0	0	0	0	1	-	11
461	Battery manufacturing	100%	0	0	-	-	0	0	0	0	2	-	19
469	Electrical and electronic components	100%	0	0	-	-	0	0	0	0	2	-	18
413	Electroplating	100%	-	-	-	-	-	-	-	-	-	-	-

Table B-1. Total Nitrogen Discharge Ranking Results Based on 2018 DMR Data

40 CFR Part	PSC Name	Cumulative Percent of Total Load	2018 Total Load (Reported and Estimated) (lb/yr)	2018 Reported Total Nitrogen Load (lb/yr)	2018 Estimated Total Nitrogen Load (lb/yr)	Percent of Total Load that is Estimated	Median Facility Load (Reported and Estimated) (lb/yr)	Reported Concentrations (mg/L) 25th Percentile	Reported Concentrations (mg/L) Median – 50th Percentile	Reported Concentrations (mg/L) 75th Percentile	Number of Facilities with a Reported TN Load[a]	Number of Facilities with an Estimated TN Load[a]	Number of Facilities in the Dataset
427	Asbestos manufacturing	100%	-	-	-	-	-	-	-	-	-	-	2
438	Metal products and machinery	100%	-	-	-	-	-	-	-	-	-	-	57
459	Photographic	100%	-	-	-	-	-	-	-	-	-	-	1
466	Porcelain enameling	100%	-	-	-	-	-	-	-	-	-	-	1
N/A	Industrial laundries	100%	-	-	-	-	-	-	-	-	-	-	3
N/A	Photo processing	100%	-	-	-	-	-	-	-	-	-	-	-

Source: ERG, 2020a

N/A: Not applicable, category is not currently subject to limitations in the national ELGs.

Note: All discharge values are rounded to three significant figures. A zero value indicates one or more facilities reported discharge as zero. "-" indicates no data were available in the dataset.

[a] The calculation for this value includes concentrations greater than or equal to zero.

Table B-2. Total Phosphorus Discharge Ranking Results Based on 2018 DMR Data

40 CFR Part	PSC Name	Cumulative Percent of Total Load	2018 Total Load (Reported and Estimated) (lb/y)	2018 Reported Total Phosphorus Load (lb/y)	2018 Estimated Total Phosphorus Load (lb/y)	Percent of Total Load that is Estimated	Median Facility Load (Reported and Estimated) (lb/yr)	Reported Concentration[a] (mg/L)			Number of Facilities with a Reported TP Load[a]	Number of Facilities with an Estimated TP Load[a]	Number of Facilities in the Dataset
								25th Percentile	Median (50th Percentile)	75th Percentile			
432	Meat and poultry products	27%	42,200,000	7,920,000	34,300,000	81%	1,900	0.234	1.18	10.6	261	67	467
460	Hospital	43%	24,000,000	60,600	23,900,000	> 99%	18	0.386	1.47	2.61	64	142	271
420	Iron and steel manufacturing	56%	19,600,000	43,300	19,600,000	> 99%	193	0.00112	0.0708	0.204	38	104	195
450	Construction and development	65%	14,500,000	8,190	14,500,000	> 99%	11	0.0764	0.550	2.670	52	38	830
436	Mineral mining and processing	70%	7,880,000	1,160,000	6,720,000	85%	20	0	0.0471	0.380	310	513	3,734
463	Plastics molding and forming	75%	7,280,000	1,440	7,280,000	> 99%	70	0.129	0.333	1.72	21	76	247
430	Pulp, paper and paperboard	80%	7,250,000	4,200,000	3,040,000	42%	6,050	0.0961	0.329	0.694	121	93	303
414	Organic chemicals, plastics and synthetic fibers	83%	5,410,000	1,560,000	3,850,000	71%	323	0.0326	0.164	0.546	163	417	757
433	Metal finishing	86%	3,440,000	113,000	3,330,000	97%	13	0.00553	0.0706	0.762	307	515	2,349
423	Steam electric power generating	88%	3,180,000	2,200,000	982,000	31%	177	0.0000101	0.0371	0.34	244	586	1,122
418	Fertilizer manufacturing	90%	3,020,000	3,000,000	20,400	1%	320	0.108	0.405	2.26	72	25	123
454	Gum and wood chemicals manufacturing	92%	2,840,000	15,200	2,820,000	99%	1,630	0.0558	0.730	1.420	4	9	21
N/A	Miscellaneous foods and beverages	93%	2,440,000	622,000	1,820,000	74%	107	0.0741	1.81	1.42	78	84	249
419	Petroleum refining	94%	1,970,000	282,000	1,690,000	86%	796	0	0.0937	0.261	64	106	1,335
N/A	Drinking water treatment	95%	1,310,000	223,000	1,090,000	83%	11	0	0.330	0.204	489	1,401	2,568
451	Concentrated aquatic animal production	96%	948,000	918,000	30,200	3%	238	0.00546	0.03	0.0806	221	99	368

Table B-2. Total Phosphorus Discharge Ranking Results Based on 2018 DMR Data

40 CFR Part	PSC Name	Cumulative Percent of Total Load	2018 Total Load (Reported and Estimated) (lb/y)	2018 Reported Total Phosphorus Load (lb/y)	2018 Estimated Total Phosphorus Load (lb/y)	Percent of Total Load that is Estimated	Median Facility Load (Reported and Estimated) (lb/yr)	Reported Concentration[a] (mg/L)			Number of Facilities with a Reported TP Load[a]	Number of Facilities with an Estimated TP Load[a]	Number of Facilitie s in the Dataset
								25th Percentile	Median (50th Percentile)	75th Percentile			
407	Canned and preserved fruits and vegetables processing	96%	843,000	288,000	555,000	66%	214	0.0916	0.313	3.00	42	43	109
455	Pesticide chemicals	97%	745,000	190,000	555,000	75%	0	0.0159	3.01	8.24	11	14	28
422	Phosphate manufacturing	97%	678,000	678,000	-	-	23,100	0.685	2.00	3.72	21	-	22
410	Textile mills	98%	579,000	548,000	31,900	5%	161	0.247	0.544	2.57	31	20	103
415	Inorganic chemicals manufacturing	98%	563,000	256,000	307,000	55%	74	0.0289	0.160	1.480	62	165	310
408	Canned and preserved seafood processing	98%	509,000	331,000	178,000	35%	146	0.0273	1.18	9.50	29	37	159
406	Grain mills	99%	426,000	341,000	85,700	20%	2,360	0.0313	0.341	7.03	33	12	71
409	Sugar processing	99%	352,000	201,000	151,000	43%	2,900	0.0813	0.448	0.744	18	7	34
429	Timber products processing	99%	256,000	35,400	220,000	86%	83	0.0495	0.168	0.510	80	148	882
439	Pharmaceutical manufacturing	99%	220,000	79,200	141,000	64%	122	0.109	0.336	1.29	28	25	113
449	Airport deicing	99%	198,000	29,100	169,000	85%	302	0.0413	0.100	0.241	57	68	245
471	Nonferrous metals forming and metal powders	99%	166,000	888	166,000	99%	58	0.0306	0.043	0.311	14	31	104
457	Explosives manufacturing	100%	165,000	2,000	163,000	99%	84	0.00973	0.0802	0.222	10	12	25
405	Dairy products processing	100%	123,000	111,000	11,900	10%	288	0.0477	0.419	1.27	95	29	144
428	Rubber manufacturing	100%	73,200	2,330	70,900	97%	41	0.00419	0.0789	0.177	19	44	136
442	Transportation equipment cleaning	100%	72,900	9,430	63,500	87%	11	0.0831	0.275	0.720	36	104	233
434	Coal mining	100%	67,100	11,900	55,200	82%	25	0.00401	0.0702	0.199	23	11	2,872

Table B-2. Total Phosphorus Discharge Ranking Results Based on 2018 DMR Data

40 CFR Part	PSC Name	Cumulative Percent of Total Load	2018 Total Load (Reported and Estimated) (lb/y)	2018 Reported Total Phosphorus Load (lb/y)	2018 Estimated Total Phosphorus Load (lb/y)	Percent of Total Load that is Estimated	Median Facility Load (Reported and Estimated) (lb/yr)	Reported Concentration[a] (mg/L)			Number of Facilities with a Reported TP Load[a]	Number of Facilities with an Estimated TP Load[a]	Number of Facilitie s in the Dataset
								25th Percentile	Median (50th Percentile)	75th Percentile			
426	Glass manufacturing	100%	62,900	37,800	25,100	40%	128	0.157	0.281	0.621	11	22	76
411	Cement manufacturing	100%	57,000	1,740	55,300	97%	2	0.0205	0.0929	0.405	227	426	2,163
N/A	Unassigned waste facility	100%	43,800	24,300	19,500	45%	7	0.00819	0.0344	0.212	78	120	504
417	Soap and detergent manufacturing	100%	37,100	231	36,800	99%	76	0.0476	0.0901	0.246	8	10	33
464	Metal molding and casting (foundries)	100%	28,200	4,640	23,500	84%	0	0	53.1	0.131	15	32	139
437	Centralized waste treatment	100%	18,600	360	18,300	98%	34	0	0.0181	0.223	5	11	19
440	Ore mining and dressing	100%	18,200	3,560	14,600	80%	385	0	0.0136	0.0313	27	32	206
445	Landfills	100%	15,400	5,680	9,750	63%	9	0.00664	0.0386	0.115	84	174	403
421	Nonferrous metals manufacturing	100%	10,500	1,640	8,870	84%	27	0.0107	0.0319	0.0723	20	33	104
N/A	Independent and standalone labs	100%	7,140	5,300	1,840	26%	28	0.0335	0.0683	0.470	13	26	47
443	Paving and roofing materials (tars and asphalt)	100%	4,420	3,770	656	15%	6	0	0.0503	0.103	39	9	727
467	Aluminum forming	100%	4,390	1,440	2,950	67%	301	0.0938	0.391	0.488	8	11	36
435	Oil & gas extraction	100%	4,010	453	3,560	89%	78	0.000111	0.0448	0.177	14	11	1,586
424	Ferroalloy manufacturing	100%	3,790	6	3,780	> 99%	32	0.0447	0.0447	0.0447	1	9	11
446	Paint formulating	100%	3,570	9	3,570	> 99%	4	0.0378	0.0756	0.203	13	16	50
412	Centralized animal feeding operations (CAFO)	100%	2,790	2,720	78	3%	4	0.0444	0.144	0.529	162	1	185
N/A	Food service establishments	100%	2,410	748	1,660	69%	5	0.864	0.0683	4.50	40	124	241
461	Battery manufacturing	100%	2,170	34	2,140	98%	324	0.661	0.333	0.661	2	5	19
425	Leather tanning and finishing	100%	1,040	944	93	9%	266	1.02	1.40	1.77	2	1	4

0400

Table B-2. Total Phosphorus Discharge Ranking Results Based on 2018 DMR Data

40 CFR Part	PSC Name	Cumulative Percent of Total Load	2018 Total Load (Reported and Estimated) (lb/y)	2018 Reported Total Phosphorus Load (lb/y)	2018 Estimated Total Phosphorus Load (lb/y)	Percent of Total Load that is Estimated	Median Facility Load (Reported and Estimated) (lb/yr)	Reported Concentration[a] (mg/L)			Number of Facilities with a Reported TP Load[a]	Number of Facilities with an Estimated TP Load[a]	Number of Facilitie s in the Dataset
								25th Percentile	Median (50th Percentile)	75th Percentile			
465	Coil coating	100%	805	805	-	-	805	53.1	0.391	53.1	1	-	19
N/A	Tobacco products	100%	769	23	746	97%	384	0.330	0.436	0.330	1	1	4
444	Waste combustors	100%	206	0	206	> 99%	23	0	0	0	1	8	9
469	Electrical and electronic components	100%	23	12	12	50%	11	1.12	0.164	1.12	5	2	18
468	Copper forming	100%	0	0	-	-	0	0	0	0	1	-	19
N/A	Printing & publishing	100%	0	0	-	-	0	0	0	0	2	-	34
413	Electroplating	100%	-	-	-	-	-	-	-	-	-	-	0
427	Asbestos manufacturing	100%	-	-	-	-	-	-	-	-	-	-	2
438	Metal products and machinery	100%	-	-	-	-	-	-	-	-	-	-	57
447	Ink formulating	100%	-	-	-	-	-	-	-	-	-	-	11
458	Carbon black manufacturing	100%	-	-	-	-	-	-	-	-	-	-	11
459	Photographic	100%	-	-	-	-	-	-	-	-	-	-	1
466	Porcelain enameling	100%	-	-	-	-	-	-	-	-	-	-	1
N/A	Industrial laundries	100%	-	-	-	-	-	-	-	-	-	-	3
N/A	Photo processing	100%	-	-	-	-	-	-	-	-	-	-	-

Source: ERG, 2020b

N/A: Not applicable, category is not currently subject to limitations in the national ELGs.

Note: All discharge values are rounded to three significant figures. A zero value indicates one or more facilities reported discharge as zero. "-" indicates no data were available in the dataset.

[a] The calculation for this value includes concentrations greater than or equal to zero.

Appendix C
Nutrient Impaired Waters Analysis Results

Table C-1. Nutrient Impaired Waters Analysis Results

40 CFR Part	PSC Name	Number of Facilities in the Dataset	Number of Facilities Discharging to Nutrient Impaired Waters[a]	Percent of Facilities Discharging to Nutrient Impaired Waters	2018 Total Nitrogen Load From Facilities Discharging to Nutrient Impaired Waters (lb/yr)	Percent of Total Nitrogen Load Discharging to Nutrient Impaired Waters	Total Phosphorus Load From Facilities Discharging to Nutrient Impaired Waters (lb/yr)	Percent of Total Phosphorus Load Discharging to Nutrient Impaired Waters
449	Airport deicing	245	21	8.6%	8,060	1.9%	0	0%
467	Aluminum forming	36	5	14%	13,100	30%	87	6.0%
427	Asbestos manufacturing	2	-	-	-	-	-	-
461	Battery manufacturing	19	3	16%	0	0%	34	100%
412	Centralized animal feeding operations (CAFO)	185	18	10%	4,710	16%	1,420	52%
407	Canned and preserved fruits and vegetables processing	109	9	8.3%	33,900	7.1%	14,100	5%
408	Canned and preserved seafood processing	159	8	5.0%	136	0.010%	1	< 1%
458	Carbon black manufacturing	11	-	-	-	-	-	-
411	Cement manufacturing	2,163	80	3.7%	121	0.040%	33	1.9%
437	Centralized waste treatment	19	-	-	-	-	-	-
434	Coal mining	2,872	94	3.3%	0	0%	0	0%
465	Coil coating	19	-	-	-	-	-	-
451	Concentrated aquatic animal production	368	36	10%	51,300	3.3%	153,000	17%
450	Construction and development	830	17	2.1%	318	0.92%	-	-
468	Copper forming	19	-	-	-	-	-	-
405	Dairy products processing	144	15	10%	12,500	3.1%	13,300	12%
N/A	Drinking water treatment	2,568	144	5.6%	39,900	1.2%	1,380	0.64%
469	Electrical and electronic components	18	2	11%	-	-	-	-
413	Electroplating	-	-	-	-	-	-	-
457	Explosives manufacturing	25	1	4.0%	2,110	0.050%	66	3.3%
424	Ferroalloy manufacturing	11	2	18%	3	1.1%	6	> 99%

0403

Table C-1. Nutrient Impaired Waters Analysis Results

40 CFR Part	PSC Name	Number of Facilities in the Dataset	Number of Facilities Discharging to Nutrient Impaired Waters[a]	Percent of Facilities Discharging to Nutrient Impaired Waters	2018 Total Nitrogen Load From Facilities Discharging to Nutrient Impaired Waters (lb/yr)	Percent of Total Nitrogen Load Discharging to Nutrient Impaired Waters	Total Phosphorus Load From Facilities Discharging to Nutrient Impaired Waters (lb/yr)	Percent of Total Phosphorus Load Discharging to Nutrient Impaired Waters
418	Fertilizer manufacturing	123	8	6.5%	812,000	13%	13,200	0.44%
N/A	Food service establishments	241	37	15%	479	0.030%	87	12%
426	Glass manufacturing	76	3	4.0%	647	1.8%	55	0.15%
406	Grain mills	71	10	14%	-	-	293	0.09%
454	Gum and wood chemicals manufacturing	21	1	4.8%	2	0.010%	511	3.4%
460	Hospital	271	23	8.5%	17,800	0.030%	2,090	3.4%
N/A	Independent and stand alone labs	47	2	4%	-	-	-	-
N/A	Industrial laundries	3	-	-	-	-	-	-
447	Ink formulating	11	-	-	-	-	-	-
415	Inorganic chemicals manufacturing	310	22	7.1%	198,000	9.1%	17,700	6.9%
420	Iron and steel manufacturing	195	23	12%	207,000	5.0%	2,000	4.6%
445	Landfills	403	26	6.5%	5,560	0.56%	99	1.7%
425	Leather tanning and finishing	4	-	-	-	-	-	-
432	Meat and poultry products	467	32	6.9%	15,100,000	44%	3,330,000	42%
433	Metal finishing	2,349	160	6.8%	407,000	18%	14,500	13%
464	Metal molding and casting (foundries)	139	12	8.6%	4	0.0%	754	16%
438	Metal products and machinery	57	-	-	-	-	-	-
436	Mineral mining and processing	3,734	196	5.3%	252	0.020%	4	< 1%
N/A	Miscellaneous foods and beverages	249	18	7.2%	7,630	1.0%	6,440	1.0%
471	Nonferrous metals forming and metal powders	104	12	12%	321	4.6%	101	11%

Table C-1. Nutrient Impaired Waters Analysis Results

40 CFR Part	PSC Name	Number of Facilities in the Dataset	Number of Facilities Discharging to Nutrient Impaired Waters[a]	Percent of Facilities Discharging to Nutrient Impaired Waters	2018 Total Nitrogen Load From Facilities Discharging to Nutrient Impaired Waters (lb/yr)	Percent of Total Nitrogen Load Discharging to Nutrient Impaired Waters	Total Phosphorus Load From Facilities Discharging to Nutrient Impaired Waters (lb/yr)	Percent of Total Phosphorus Load Discharging to Nutrient Impaired Waters
421	Nonferrous metals manufacturing	104	6	6.3%	121,000	47%	609	37%
435	Oil & gas extraction	1,586	11	0.69%	68	0.22%	45	10%
440	Ore mining and dressing	206	3	1.5%	41,200	9.9%	1,400	39%
414	Organic chemicals, plastics and synthetic fibers	757	46	6.1%	430,000	5.5%	37,000	2.4%
446	Paint formulating	50	3	6.0%	-	-	-	-
443	Paving and roofing materials (tars and asphalt)	727	27	3.7%	48,600	95%	3,590	95%
455	Pesticide chemicals	28	1	3.6%	-	-	-	-
419	Petroleum refining	1,335	109	8.2%	49,800	1.5%	2,920	1.0%
439	Pharmaceutical manufacturing	113	4	3.5%	560	0.18%	5,260	6.6%
422	Phosphate manufacturing	22	1	4.6%	-	-	127,000	19%
N/A	Photo processing	-	-	-	-	-	-	-
459	Photographic	1	-	-	-	-	-	-
463	Plastics molding and forming	247	32	13%	2,130	15%	458	32%
466	Porcelain enameling	1	-	-	-	-	-	-
N/A	Printing & publishing	34	3	9%	-	-	-	-
430	Pulp, paper and paperboard	303	32	11%	2,930,000	12%	483,000	12%
428	Rubber manufacturing	136	14	10%	571	0.7%	24	1.0%
417	Soap and detergent manufacturing	33	2	6.1%	1,130	59%	36	16%
423	Steam electric power generating	1,122	67	6.0%	171,000	0.58%	265,000	12%
409	Sugar processing	34	4	12%	-	-	-	-
410	Textile mills	103	2	1.9%	-	-	-	-

Table C-1. Nutrient Impaired Waters Analysis Results

40 CFR Part	PSC Name	Number of Facilities in the Dataset	Number of Facilities Discharging to Nutrient Impaired Waters[a]	Percent of Facilities Discharging to Nutrient Impaired Waters	2018 Total Nitrogen Load From Facilities Discharging to Nutrient Impaired Waters (lb/yr)	Percent of Total Nitrogen Load Discharging to Nutrient Impaired Waters	Total Phosphorus Load From Facilities Discharging to Nutrient Impaired Waters (lb/yr)	Percent of Total Phosphorus Load Discharging to Nutrient Impaired Waters
429	Timber products processing	882	23	2.6%	-	-	-	-
N/A	Tobacco products	4	1	25%	1,690	99%	-	-
442	Transportation equipment cleaning	233	16	6.9%	863	1.1%	48	0.51%
N/A	Unassigned waste facility	504	37	7%	166,000	29%	22,900	94%
444	Waste combustors	9	-	-	-	-	-	-

Source: ERG, 2020d

N/A: Not applicable, category is not currently subject to limitations in the national ELGs.

Note: All discharge values are rounded to three significant figures. A zero value indicates one or more facilities reported discharge as zero. "-" indicates no data were available in the dataset.

[a] Facilities discharging to waters with more than one impairment category (e.g., facility A discharges to waters impaired for nutrients and algal growth) are only counted once.

Preliminary Technology Review: Membrane Wastewater Treatment

1. Introduction

EPA reviewed information on membrane treatment of wastewater from previous effluent limitations, guidelines, and standards (ELGs) and EPA's Industrial Wastewater Treatment Technology (IWTT, https://www.epa.gov/eg/industrial-wastewater-treatment-technology-database-iwtt) database as of August 2021 to summarize the status in industrial applications, provide an overview of the technology for use in industry studies, and characterize treatment capabilities. Section 2 includes an overview of membrane wastewater treatment and treatment capabilities. Section 3 describes considerations for evaluating this technology as part of an industry study or rulemaking. Section 4 presents references.

2. Technology Overview

A membrane is a barrier that allows certain substances to pass through while blocking others. In wastewater treatment applications, membranes allow water to pass through while preventing unwanted substances from passing through with the water. This occurs when a driving force is applied, such as a pressure differential. Molecules and particles smaller than the pore size, the spaces or voids in the membrane, pass through the membrane to the opposite side while larger matter builds up in a cake layer on the membrane surface. Accumulated material on the membrane surface must be cleaned to maintain membrane performance.

Depending on the pore size and membrane configuration, membranes can be used to treat total suspended solids (TSS), total dissolved solids (TDS), oil and grease, microbes, natural organic matter, and minerals. Key streams generated by membrane treatment include:

- **Permeate** - The treated wastewater stream produced by membrane treatment. This is the water that passes through the membrane pores.
- **Concentrate** – The material that does not pass through the membrane. This can also be referred to as reject. Portions of this stream can be recirculated back to the inlet of the membrane for further treatment, further treated by other technologies, or disposed.
- **Wastewater generated from cleaning operations** – This includes spent cleaning chemicals and material built up on the surface of the membrane.

Membrane systems are often characterized by their percent recovery, which refers to the amount of influent that will be recovered as permeate. This value will vary based on the characteristics of the water being treated and the membrane but is useful to determine the amount of concentrate that will need to be managed. For example, a membrane system with 80 percent recovery that treats a 100 gallon per minute flow will generate in 80 gallons per minute of permeate and 20 gallons per minute of concentrate.

Disposal options for the concentrate stream will depend on the volume and characteristics Potential concentrate management options include:

- Deep-well Injection – Sequestering the concentrate stream deep underground, below drinking water aquifers. This disposal option can be used for smaller amounts of wastewater and depends on wastewater characteristics and the proximity to a well that is able to accept the wastewater.
- Evaporation Pond(s) – Using ponds to evaporate water and isolate solids. This type of disposal option is best suited for plants located in arid climates with a large amount of land available.
- Land Application – Applying the waste stream to soil surfaces. This type of disposal can be limited to those locations near land willing to accept the wastewater.
- Offsite Waste Management – Sending the stream to a centralized waste treatment (CWT) facility, publicly owned treatment works (POTW), or offsite disposal contractor.
- Additional wastewater treatment - Using additional treatment technologies to achieve further reduction in volume or eliminating the water and generating a solid stream. This could include using evaporation/crystallization or other thermal technologies operated to remove all or part of the liquid portion of the stream or filter presses where solids are disposed, and liquid is recycled.

Fouling is the general term for substances present in the wastewater absorbing or depositing on the surface of the membrane. The substances can be inorganic material such as salts, organic matter like fats, oils, or greases, or biofouling from the formation of biofilms on the membrane surface. A declining in the flow through the membrane or an increase in the driving force required to maintain the flow can indicate the need for membrane cleaning and eventually decreases the lifespan of the membrane. Membranes can be cleaned using chemicals or injecting air in the inlet water to create a turbulent environment to flush fouling substances off the membrane surface. Chemical cleaning solutions are generally acidic in nature but can vary based on the membrane material and wastewater characteristics. Spent cleaning wastewater can require neutralization prior to disposal. Depending on the characteristics, spent cleaning wastewater can be combined with membrane concentrate for disposal.

Even with regular cleaning, membranes can still degrade over time. Pores can become clogged, or cleaning operations are unable to clean all the fouling material. Pressure drop across a membrane is regularly monitored as an indicator of when membrane cleaning or replacement is needed. As the pressure drop across the membrane increases, it is becoming more and more difficult for water to pass through the membrane. If cleaning is unable to reduce the drop in pressure it may signal a need to replace the membrane. Studies of membrane life based on membrane replacements suggest a life of approximately eight years, with ceramic membranes expected to last longer (Judd, 2018). However, the timing of cleaning and life of a membrane will vary based on many factors including influent wastewater characteristics, operating pressures, and membrane configuration.

Membrane processes are often distinguished by the pore size and/or the process by which they affect separation. The most common membrane processes used for treatment of industrial wastewater are:

- Microfiltration
- Ultrafiltration
- Nanofiltration
- Reverse osmosis

Microfiltration (MF), ultrafiltration (UF), and nanofiltration (NF) use pressure to help force water through a semi-permeable membrane. Separation occurs based on the size of the pores as the water is pushed through. Reverse osmosis (RO) also uses pressure, but typically a much higher pressure than MF, UF, or NF, and relies on principles of osmosis. Osmosis occurs when a semi-permeable membrane separates two salt solutions of different concentrations. The water will migrate from the weaker solution to the stronger solution, until the two solutions are of the same concentration, because the semi-permeable membrane allows the water to pass through, but not the salt. In reverse osmosis, the two solutions are still separated by a semi-permeable membrane, but pressure is applied to reverse the

natural flow of the water. This forces the water to move from the more concentrated solution to the weaker. The contaminants end up on one side of the semi-permeable membrane and the treated water is on the other side. Table 1 compares the most common membrane processes used for industrial wastewater treatment.

Table 1. Membrane Process Comparison

Process	Pore Size	Typical Operating Pressure	Pollutants Removed	Notes
MF	0.1 – 10 µm	< 50 psi	• Suspended solids • Macromolecules • Colloids • Bacteria	• Can be used as stand-alone treatment or prior to RO to reduce system size and fouling potential.
UF	0.001 – 0.1 µm	< 50 psi	• Suspended solids • Proteins • Fatty acids • Pathogens, viruses • Silica	• Can be used as stand-alone treatment or prior to RO to reduce system size and fouling potential.
NF	1-10 nm	50 – 150 psi	• Calcium • Heavy metals • Salts • Dissolved organics	• The basic design guidelines, operational parameters, and process considerations for NF and RO are similar.
RO	<1 nm	125 – 1,200 psi[a]	• Monovalent atoms (e.g., chlorine) • Heavy metals • Trace phosphates • Dissolved organics	• Cost of RO is typically high due to the energy costs of supplying a pressure for filtration to occur. Operating at lower pressures will reduce costs but can reduce removal efficiency.

Abbreviations – micrometers (µm), nanometers (nm)

a – RO systems can be categorized into three different subgroups, low-pressure systems which operate between 125 and 300 psi, standard systems which operate between 350 and 600 psi, and high-pressure systems which operate between 800 and 1,200 psi. High-pressure systems are typically used for seawater applications.

Membranes can be made of different types of materials including polymer-based films or ceramics. These membrane materials can be molded into different shapes (e.g., in a flat sheet or rolled into a tube) and configured in various ways. Membrane configuration, pore size, and membrane material of construction depend on the application, required treatment level, and characteristics of the water being treated. Common membrane configurations include:

- **Hollow fiber systems –** Uses several long, filaments or membrane tubes ranging from less than 1 to 3.5 millimeter in diameter in a PVC shell. As wastewater is pumped through each filament, particles too large to pass through remain inside. Because the filaments are so small, and packed

so tightly together, scaling can easily develop as particles are deposited on the filaments or plug the small spaces between the filaments. Irreversible fouling and fiber breakage are the main problems with hollow fiber systems.

- **Plate and frame systems** – Uses membranes and spacers stacked together and held in place with a frame. Because this configuration includes spacers, the membranes are not packed as tightly together, and this configuration can be used for wastewater with higher solids content or higher viscosities since fluid can flow between the membranes without clogging/plugging issues. However, the addition of these spacers also requires a greater footprint than in other membrane configurations to accommodate the same membrane surface area.
- **Spiral-wound systems** – Uses a flat sheet membrane and spacer wrapped around a permeate collection tube to produce flow channels for permeate and feedwater. The feedwater is routed through these spacers, providing a space for water to flow between the membrane surfaces. The layers are wrapped concentrically around the inner tube creating the spiral shape. Water that reaches the center and flows into the inner tube is considered permeate. This design maximizes flow while minimizing the membrane module size. Due to the high packing density, TSS must be reduced to less than 5mg/L in the feed stream to prevent plugging of the membrane.
- **Tubular systems** – Uses several tube-like membranes, typically with a diameter of 2 millimeters or greater, placed within a pipe/shell. As the waste stream is passed through the tubes, it transfers the permeate to the pipe/shell side. These systems are much like hollow fiber systems, but with a lower packing density. The lower packing density allows for a more turbulent flow which can stir up particles that may otherwise scale or foul the membrane. This type of configuration can be used for hard-to-treat streams, such as those with high TDS, TSS, and oils, greases, and fats.

Recent developments in membrane technology have focused on water/wastewater reuse, fouling control, and nutrient control. The applications for membrane systems for wastewater treatment continues to expand and the cost for these systems is decreasing. Membrane systems are being developed to handle streams with higher solids content that have been typically considered too difficult for membranes to treat. Technologies that incorporate vibration, more systematic cleaning, and other methods to decrease fouling are emerging.

3. Considerations for Industry Studies

The versatility of membranes in treating wastewater along with lower costs have broadened their use in industrial treatment systems. More stringent water quality-based effluent limitations for direct dischargers have also contributed to examining new wastewater treatment options. Membranes are used by a variety of industries and can be used for treating the entire wastestream, or for sidestream treatment.

Membrane cleaning and membrane replacement can increase maintenance and operating costs and remain the limiting factor affecting the widespread application of membranes for industrial wastewater treatment.

3.1 Industrial Applications

Membranes are often combined with other chemical, physical, and biological wastewater treatment systems. Membrane filtration is part of the technology basis for BAT or PSES in one industrial point source category, Steam Electric Power Generating (CFR Part 423) (U.S. EPA, ELG Database).

Table 2 lists the regulated categories reporting the use of membrane filtration, as part of a treatment train, from EPA's IWTT database. Table 2 also lists the targeted pollutants for the full treatment train, as identified within IWTT, for papers associated with the industries presented.

Table 2. Regulated Industries Reporting the Use of Membrane Filtration Systems as Part of a Treatment Train in IWTT

Industrial Category	40 CFR Part	Targeted Pollutants for Full Treatment Train
Dairy Products Processing	405	Biochemical Oxygen Demand, Chemical Oxygen Demand, Fats, Total Dissolved Solids, Total Suspended Solids
Canned and Preserved Fruits and Vegetables Processing	407	Chemical Oxygen Demand, Total Dissolved Solids, Total Suspended Solids
Textile Mills	410	Solids
Concentrated Animal Feeding Operations (CAFOs)	412	Chemical Oxygen Demand, Nutrients, Total Suspended Solids
Organic Chemicals, Plastics and Synthetic Fibers (OCPSF)	414	Total Suspended Solids
Petroleum Refining	419	Biochemical Oxygen Demand, Chemical Oxygen Demand, Metals, Nutrients, Oil and Grease, Organics, Phenols, Solids, Total Dissolved Solids
Iron and Steel Manufacturing	420	Metals, Organics
Nonferrous Metals Manufacturing	421	Metals
Steam Electric Power Generating	423	Metals, Nutrients, Total Dissolved Solids, Total Suspended Solids
Ferroalloy Manufacturing	424	Cyanide, Metals, Nutrients, Sulfates, Total Dissolved Solids
Pulp, Paper and Paperboard	430	Biochemical Oxygen Demand, Chemical Oxygen Demand, Nutrients, Total Suspended Solids
Metal Finishing	433	Biochemical Oxygen Demand, Chemical Oxygen Demand, Metals, Nutrients, Oil and Grease, Organics, Solids
Coal Mining	434	Chemical Oxygen Demand, Metals, Nutrients, Organics, Total Dissolved Solids, Total Suspended Solids
Oil and Gas Extraction	435	Biochemical Oxygen Demand, Metals, Nutrients, Oil and Grease, Organics, Phenols, Solids
Mineral Mining and Processing	436	Metals, Nutrients, Organics, Total Dissolved Solids
Pharmaceutical Manufacturing	439	Total Suspended Solids
Transportation Equipment Cleaning	442	Biochemical Oxygen Demand, Chemical Oxygen Demand, Metals, Oil and Grease, Solids
Landfills	445	Biochemical Oxygen Demand, Chemical Oxygen Demand, Nutrients, Phenol, Thiocyanate
Airport Deicing	449	None identified.
Aluminum Forming	467	Biochemical Oxygen Demand, Chemical Oxygen Demand, Metals, Oil and Grease, Solids, Surfactants
Electrical and Electronic Components	469	Chemical Oxygen Demand, Metals, Nutrients, Solids

Table 2. Regulated Industries Reporting the Use of Membrane Filtration Systems as Part of a Treatment Train in IWTT

Industrial Category	40 CFR Part	Targeted Pollutants for Full Treatment Train
Miscellaneous Foods and Beverages	503	Total Suspended Solids
Independent and Stand Alone Labs	507	Metals

Source: U.S. EPA, IWTT.

Note: The targeted pollutants may not all be removed by membrane filtration alone. This table includes any treatment train where membrane filtration was noted, so additional treatment units may be included.

3.2 Applicability Considerations

As described Section 2, wastewater flowrate and characteristics will impact the membrane configuration and pore size. Membrane systems can be used in combination to achieve effective treatment (e.g., using MF or UF prior to RO to optimize RO performance). In all cases, the final destination of the permeate and concentrate streams should be considered when designing a membrane system.

3.3 Cost Considerations

Advances in membrane technology have resulted in lower costs, making membrane systems more viable from an economic standpoint. Membranes may also allow for the reuse of treated wastewater within production processes which decreases the volume discharged and required intake water volumes. System design and overall cost depend on the characteristics of the influent and the desired effluent quality. Costs for RO and NF treatment systems depend on the size of the system, which are impacted by wastewater flow rates and the level of pretreatment prior to membrane filtration. For example, if MF is used as pretreatment upstream of an RO system, the RO system can be smaller and less expensive. Concentrate disposal can be a large percentage of operation and maintenance (O&M) costs depending on the volume and method selected for disposal. Cost components include the following:

Capital Costs

- Purchased equipment
- Site preparation
- Engineering design fees
- Administrative/legal costs
- Inspections
- Contingencies
- Profits and overheads

Treatment system equipment for membrane treatment often includes the following:

- Tanks (equalization, permeate storage, concentrate storage)
- Membrane unit(s)
- Pumps
- Chemical cleaning equipment (tanks, pumps, storage)
- Pretreatment equipment
- Concentrate management equipment

Annual costs

- Chemicals (for cleaning)

- Energy requirements to run the treatment system
- Concentrate disposal
- Labor for operation and maintenance
- Maintenance materials

Membrane systems require routine maintenance for proper operation. Maintenance activities include:

- Membrane replacement.
- Membrane cleaning.
- Calibrating instrumentation and cleaning probes.
- Maintaining pumps (inspection, cleaning, lubrication, replacing seals and packing, replacing check valves, cleaning strainers).
- Monitoring tanks (inspection, cleaning, corrosion prevention).

3.4 Non-Water Quality Environmental Impacts

Non-water quality environmental impacts (NWEQI) from membrane treatment are higher for RO systems than MF or UF systems due to the increased pressure requirements. It can be difficult to compare NWQEI among different membrane systems because these impacts can depend heavily on the method of concentrate disposal (e.g., large energy requirements for thermal systems or large air emissions from hauling). Generally, systems with lower percent recoveries, where more concentrate is generated are also more likely to have higher NWQEI as this larger concentrate stream will need to be manage and disposed.

NWQEI for membrane treatment include:

- Energy required to pressurize the treatment system and pump wastewater.
- Energy requirements for concentrate disposal.
- Air emissions from treatment system and transportation.

4. References

1. U.S. EPA. Effluent Limitations Guidelines and Standards (ELG) Database. Available online at: https://owapps.epa.gov/elg/

2. U.S. EPA. Industrial Wastewater Treatment Technology Database (IWTT). Available online at: https://www.epa.gov/eg/industrial-wastewater-treatment-technology-database-iwtt

3. Judd, Simon. (2020). Membrane ageing – factors determining membrane replacement. Available online at: https://www.thembrsite.com/blog/membrane-ageing-factors-determining-membrane-replacement/.

NPDES Permit No. IL0002453
Notice No. SMT:20052001.smt

Public Notice Beginning Date: **November 20, 2020**

Public Notice Ending Date: **December 21, 2020**

National Pollutant Discharge Elimination System (NPDES)
Permit Program

Draft Reissued NPDES Permit to Discharge into Waters of the State

Public Notice/Fact Sheet Issued By:

Illinois Environmental Protection Agency
Bureau of Water,
Division of Water Pollution Control
Permit Section
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276
217/782-0610

Name and Address of Discharger:	Name and Address of Facility:
Stepan Company 22500 Stepan Drive Elwood, Illinois 60421	Stepan Company 22500 Stepan Drive Elwood, Illinois 60421 (Will County)

The Illinois Environmental Protection Agency (IEPA) has made a tentative determination to issue a NPDES permit to discharge into the waters of the state and has prepared a draft permit and associated fact sheet for the above named discharger. The Public Notice period will begin and end on the dates indicated in the heading of this Public Notice/Fact Sheet. The last day comments will be received will be on the Public Notice period ending date unless a commentor demonstrating the need for additional time requests an extension to this comment period and the request is granted by the IEPA. Interested persons are invited to submit written comments on the draft permit to the IEPA at the above address. Commentors shall provide his or her name and address and the nature of the issues proposed to be raised and the evidence proposed to be presented with regards to those issues. Commentors may include a request for public hearing. Persons submitting comments and/or requests for public hearing shall also send a copy of such comments or requests to the permit applicant. The NPDES permit and notice number(s) must appear on each comment page.

The application, engineer's review notes including load limit calculations, Public Notice/Fact Sheet, draft permit, comments received, and other documents are available for inspection and may be copied at the IEPA between 9:30 a.m. and 3:30 p.m. Monday through Friday when scheduled by the interested person.

If written comments or requests indicate a significant degree of public interest in the draft permit, the permitting authority may, at its discretion, hold a public hearing. Public notice will be given 45 days before any public hearing. Response to comments will be provided when the final permit is issued. For further information, please call Shu-Mei Tsai at 217/782-0610.

The applicant is engaged in the production of anionic surfactants by oleum sulfonation, sulfation and air-SO3 sulfonation, non-ionic surfactants by alkoxylation, cationic surfactants by quaternization, emulsifiers by sulfation and neutralization, phthalic anhydride by catalytic reaction, salts of sulfonated petrochemical feed stocks by neutralization, methyl esters and isopropyl esters by esterification and fractionation, drum dried and spray dried detergents, liquid detergents by batch blending, alkyamides by amidization and urethane foams and polyols by batch process (SIC 2821, 2841, 2842, 2843, 2844, 2865, and 2869) The water source is obtained from three on-site wells for the cooling water. Wastewater is generated by process operations, periodically discharging the cooling tower blowdown when solids build-up, sanitary wastewater and precipitation which contacts the site. Plant operation results in an average discharge of 0.88 MGD of process wastewater, sanitary wastewater, cooling tower blowdown, and stormwater from outfall 001 and an intermittent discharge of stormwater from outfalls 010 and 011.

The following modification is proposed:

1. The thermal compliance schedule has been added in the permit.
2. The language of Time-Limited Water Quality Standards for chloride has been added in the permit.

Application is made for the existing discharges which are located in Will County, Illinois. The following information identifies the discharge point, receiving stream and stream classifications:

Outfall	Receiving Stream	Latitude		Longitude		Stream Classification	Biological Stream Characterization
001	Des Plaines River	41° 26' 32"	North	88° 09' 50"	West	Secondary Contact	C
010	Cedar Creek	41° 26' 44"	North	89° 09' 49"	West	General Use	Not Rated
011	Des Plaines River	41° 26' 23"	North	88° 09' 49"	West	Secondary Contact	C

To assist you further in identifying the location of the discharge please see the attached map.

The subject facility discharges to the Des Plaines River, Water Body Segment (IL_G-12), at a point where 1501.5 cfs of flow exists upstream of the outfall during critical 7Q10 low-flow conditions. The Des Plaines River is not listed as a biologically significant stream in the 2008 Illinois Department of Natural Resources Publication *Integrating Multiple Taxa in a Biological Stream Rating System,* nor is it given an integrity rating in that document. The Des Plaines River at this location is not subject to enhanced dissolved oxygen standards, however, it is approximately 1.0 mile downstream from the treatment plant to the end of segment IL_G-12 is a distance of 2.2 stream miles. The impaired designated uses and pollutants causing impairment are tabulated below:

Designated Uses	Pollutants Causing Impairment
Fish Consumption	Mercury and Polychlorinated biphenyls (PCBs)

The discharge from the facility shall be monitored and limited at all times as follows:

Outfall: 001 Process Wastewater, Sanitary Wastewater, Cooling Tower Blowdown and Stormwater (DAF = 0.88 MGD)

	LOAD LIMITS lbs/day DAF (DMF)			CONCENTRATION LIMITS mg/L		
PARAMETER	30 DAY AVERAGE	DAILY MAXIMUM	REGULATION	30 DAY AVERAGE	DAILY MAXIMUM	REGULATION
Flow (MGD)						
pH						35 IAC 304.125
Temperature						35 IAC 302.211
BOD_5	167	334	35 IAC 309.143	20	40	35 IAC 304.120(b)
Total Suspended Solids	209	417	35 IAC 309.143	25	50	35 IAC 304.120(b)
Oil and Grease			40 CFR 122.44(l)	15	30	35 IAC 304.124
Total Residual Chlorine					0.05	35 IAC 302.410
MBAS	252	510	40 CFR122.44(l)			
Acenaphthene	0.16	0.42	40 CFR 414.91	0.02	0.06	40 CFR 414.91
Acenaphthylene	0.16	0.42	40 CFR 414.91	0.02	0.06	40 CFR 414.91
Acrylonitrile	0.68	1.71	40 CFR 414.91	0.10	0.24	40 CFR 414.91
Anthracene	0.16	0.42	40 CFR 414.91	0.02	0.06	40 CFR 414.91
Benzene	0.26	0.96	40 CFR 414.91	0.04	0.14	40 CFR 414.91
Benzo(a)anthracene	0.16	0.42	40 CFR 414.91	0.02	0.06	40 CFR 414.91

3,4-Benzofluoranthene	0.16	0.43	40 CFR 414.91	0.02	0.06	40 CFR 414.91
	LOAD LIMITS lbs/day DAF (DMF)			CONCENTRATION LIMITS mg/L		
PARAMETER	30 DAY AVERAGE	DAILY MAXIMUM	REGULATION	30 DAY AVERAGE	DAILY MAXIMUM	REGULATION
Outfall 001 Continued:						
Benzo(k)fluoranthene	0.16	0.42	40 CFR 414.91	0.02	0.06	40 CFR 414.91
Benzo(a)pyrene	0.16	0.43	40 CFR 414.91	0.02	0.06	40 CFR 414.91
Bis(2-ethylhexyl)phthalate	0.73	1.97	40 CFR 414.91	0.10	0.28	40 CFR 414.91
Carbon Tetrachloride	0.13	0.27	40 CFR 414.91	0.02	0.04	40 CFR 414.91
Chlorobenzene	0.11	0.20	40 CFR 414.91	0.02	0.03	40 CFR 414.91
Chloroethane	0.73	1.89	40 CFR 414.91	0.10	0.27	40 CFR 414.91
Chloroform	0.15	0.32	40 CFR 414.91	0.02	0.05	40 CFR 414.91
2-Chlorophenol	0.22	0.69	40 CFR 414.91	0.03	0.10	40 CFR 414.91
Chrysene	0.16	0.42	40 CFR 414.91	0.02	0.06	40 CFR 414.91
Di-n-butyl phthalate	0.19	0.40	40 CFR 414.91	0.03	0.06	40 CFR 414.91
1,2-Dichlorobenzene	0.54	1.15	40 CFR 414.91	0.08	0.16	40 CFR 414.91
1,3-Dichlorobenzene	0.22	0.31	40 CFR 414.91	0.03	0.04	40 CFR 414.91
1,4-Dichlorobenzene	0.11	0.20	40 CFR 414.91	0.02	0.03	40 CFR 414.91
1,1-Dichloroethane	0.16	0.42	40 CFR 414.91	0.02	0.06	40 CFR 414.91
1,2- Dichloroethane	0.48	1.49	40 CFR 414.91	0.07	0.21	40 CFR 414.91
1,1-Dichloroethylene	0.11	0.18	40 CFR 414.91	0.02	0.03	40 CFR 414.91
1,2-trans- Dichloroethylene	0.15	0.38	40 CFR 414.91	0.02	0.05	40 CFR 414.91
2,4-Dichlorophenol	0.28	0.79	40 CFR 414.91	0.04	0.11	40 CFR 414.91
1,2-Dichloropropane	1.08	1.62	40 CFR 414.91	0.15	0.23	40 CFR 414.91
1,3-Dichloropropylene	0.20	0.31	40 CFR 414.91	0.03	0.04	40 CFR 414.91
Diethyl phthalate	0.57	1.43	40 CFR 414.91	0.08	0.20	40 CFR 414.91
2,4-Dimethylphenol	0.13	0.25	40 CFR 414.91	0.02	0.04	40 CFR 414.91
Dimethyl phthalate	0.13	0.33	40 CFR 414.91	0.02	0.05	40 CFR 414.91
4,6-Dinitro-o-cresol	0.55	1.95	40 CFR 414.91	0.08	0.28	40 CFR 414.91
2,4-Dinitrophenol	0.50	0.87	40 CFR 414.91	0.07	0.12	40 CFR 414.91
2,4-Dinitrotoluene	0.80	2.01	40 CFR 414.91	0.11	0.29	40 CFR 414.91
2,6-Dinitrotoluene	1.80	4.52	40 CFR 414.91	0.26	0.64	40 CFR 414.91

Ethylbenzene	0.23	0.76	40 CFR 414.91	0.03	0.11	40 CFR 414.91
Fluoranthene	0.18	0.48	40 CFR 414.91	0.03	0.07	40 CFR 414.91
	LOAD LIMITS lbs/day DAF (DMF)			CONCENTRATION LIMITS mg/L		
PARAMETER	30 DAY AVERAGE	DAILY MAXIMUM	REGULATION	30 DAY AVERAGE	DAILY MAXIMUM	REGULATION
Outfall 001 Continued:						
Fluorene	0.16	0.42	40 CFR 414.91	0.02	0.06	40 CFR 414.91
Hexachlorobenzene	0.11	0.20	40 CFR 414.91	0.02	0.03	40 CFR 414.91
Hexachlorobutadiene	0.14	0.35	40 CFR 414.91	0.02	0.05	40 CFR 414.91
Hexachloroethane	0.15	0.38	40 CFR 414.91	0.02	0.05	40 CFR 414.91
Methyl Chloride	0.61	1.34	40 CFR 414.91	0.09	0.19	40 CFR 414.91
Methylene Chloride	0.28	0.63	40 CFR 414.91	0.04	0.09	40 CFR 414.91
Naphthalene	0.16	0.42	40 CFR 414.91	0.02	0.06	40 CFR 414.91
Nitrobenzene	0.19	0.48	40 CFR 414.91	0.03	0.07	40 CFR 414.91
2-Nitrophenol	0.29	0.49	40 CFR 414.91	0.04	0.07	40 CFR 414.91
4-Nitrophenol	0.51	0.87	40 CFR 414.91	0.07	0.12	40 CFR 414.91
Phenanthrene	0.16	0.42	40 CFR 414.91	0.02	0.06	40 CFR 414.91
Phenol	0.11	0.18	40 CFR 414.91	0.02	0.03	40CFR122.44(l)
Pyrene	0.18	0.47	40 CFR 414.91	0.03	0.07	40 CFR 414.91
Tetrachloroethylene	0.16	0.40	40 CFR 414.91	0.02	0.06	40 CFR 414.91
Toluene	0.18	0.56	40 CFR 414.91	0.03	0.08	40 CFR 414.91
Chromium	7.9	17	35 IAC 309.143	1.0	2.0	35 IAC 304.124
Copper	4.2	8.3	35 IAC 309.143	0.5	1.0	35 IAC 304.124
Cyanide	0.83	1.7	35 IAC 309.143	0.10	0.20	35 IAC 304.124
Lead	1.67	3.3	35 IAC 309.143	0.2	0.4	35 IAC 304.124
Nickel	8.3	17	35 IAC 309.143	1.0	2.0	35 IAC 304.124
Zinc	7.4	17	35 IAC 309.143	1.0	2.0	35 IAC 304.124
1,2,4-Trichlorobenzene	0.48	0.99	40 CFR 414.91	0.07	0.14	40 CFR 414.91
1,1,1-Trichloroethane	0.15	0.38	40 CFR 414.91	0.02	0.05	40 CFR 414.91
1,1,2-Trichloroethane	0.15	0.38	40 CFR 414.91	0.02	0.05	40 CFR 414.91
Trichloroethylene	0.15	0.38	40 CFR 414.91	0.02	0.05	40 CFR 414.91
Vinyl Chloride	0.73	1.89	40 CFR 414.91	0.10	0.27	40 CFR 414.91

Total Nitrogen (as N)				Monitor Only		35 IAC 309.146
Total Phosphorus (as P)				Monitor Only		35 IAC 309.146
Chloride				Monitor Only		35 IAC 309.146

Outfalls: 010 North Property Stormwater (Intermittent Discharge)
011 South Property Stormwater (Intermittent Discharge)

	LOAD LIMITS lbs/day DAF (DMF)			CONCENTRATION LIMITS mg/L		
PARAMETER	30 DAY AVERAGE	DAILY MAXIMUM	REGULATION	30 DAY AVERAGE	DAILY MAXIMUM	REGULATION
Stormwater Pollution Prevention Plan						40 CFR 122.26(b)(14)(ii)

Load Limit Calculations:

A. Load limit calculations for the following pollutant parameters limited at outfall 001 were based on a process water flow of 0.846 and using the formula of process water flow (MGD) X concentration limit (mg/l) X 8.34 = the average or maximum load limit (lbs/day). A DMF of 1.0 MGD was used to calculate the daily max effluent limits for pollutants regulated under 35 IAC 304.

B. Production based load limits for the following subcategories were derived during this permit review, but the information has been determined to be Confidential Business Information and will not be public noticed.

Part 417 Soap and Detergent Manufacturing Point Source Category
Subpart I – Oleum Sulfonation and Sulfation Subcategory (40 CFR 417.93)
Subpart J – Air – SO3 Sulfation and Sulfonation Subcategory (40 CFR 417.103)
Subpart N – Neutralization of Sulfuric Acid Esters and Sulfonic Acids Subcategory (40 CFR 417.143)
Subpart O – Manufacture of Spray Dried Detergents Subcategory
Subpart P – Manufacture of Liquid Detergents Subcategory
Subpart R – Manufacture of Drum Dried Detergents Subcategory (40 CFR 417.183)

Part 414 Organic Chemicals Plastics and Synthetic Fibers (OCPSF) Point Source Category
Subpart G – Bulk Organic Chemicals (40 CFR 414.71
Subpart E – Urethane Foam Resin (40 CFR 414.51)

Part 414 OCPSF Subpart I – Direct Discharge Point Sources That Use End-of-Pipe Biological Treatment

Example Calculation:

Acenaphthene Daily Maximum Load Limit = Concentration given in 40 CFR 414.91 x Flow x Unit Conversion Factor =
59 µg/L x (1 mg / 1000 µg) x 0.846 MGD x 8.34 = 0.42 lbs/day

Acenaphthene Monthly Average Load Limit = Concentration Given in 40 CFR 414.91 x Flow x Unit Conversion Factor =
22 µg /L x (1 mg / 1000 µg) x 0.846 MGD x 8.34 = 0.16 lbs/day

The load limits appearing in the permit will be the more stringent of the State and Federal Guidelines.

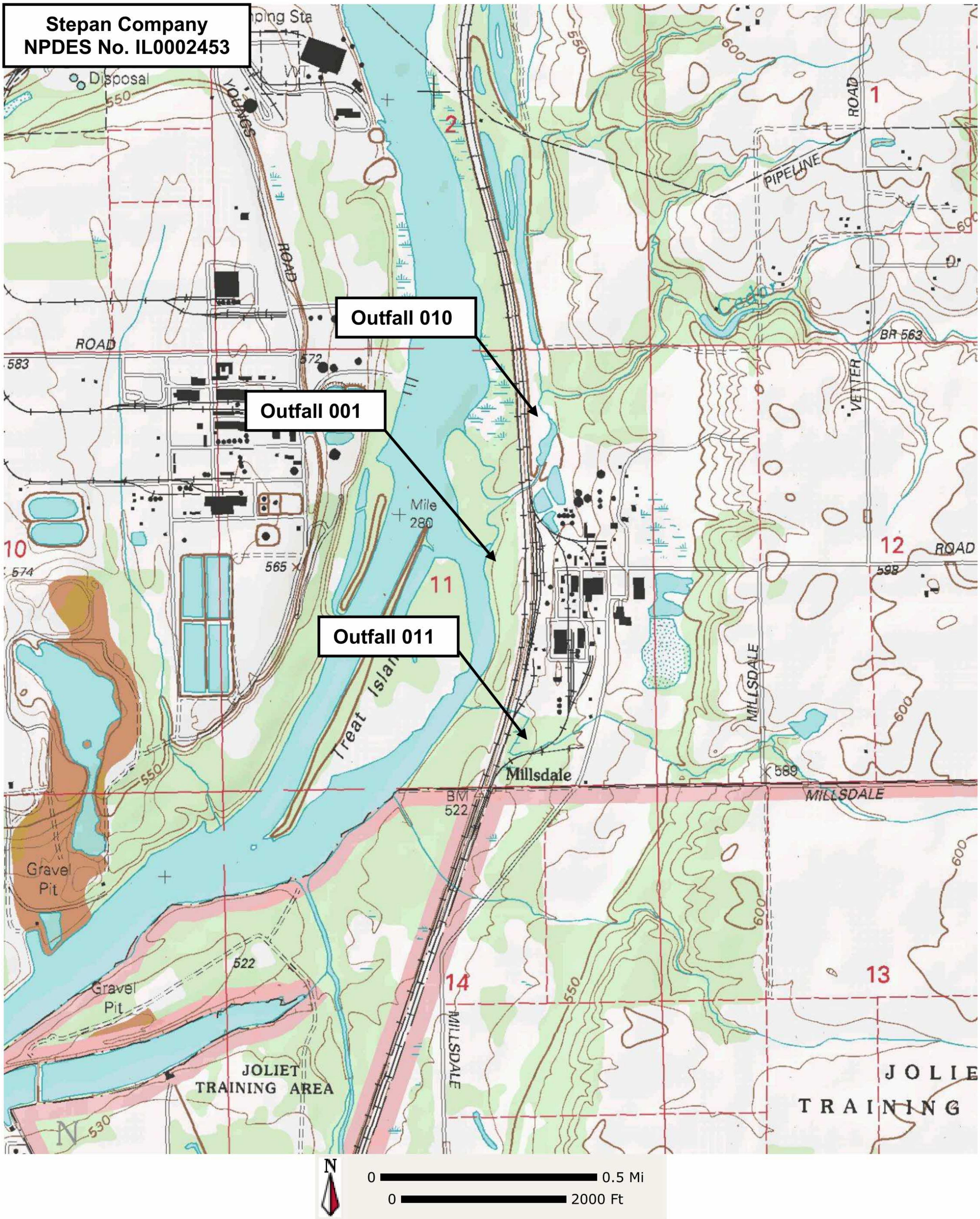
The following explain the conditions of the proposed permit:

Testing for surfactants through the use of methylene blue active substances (MBAS) monitoring is required by 40 CFR 136.3(a) and was found to be reasonable per PCB 79-161 dated November 19, 1981.

Part 417 requires COD limits but they were not included in the permit because PCB 79-161 dated November 19, 1981 found the requirement unnecessary to accomplish purposes of the Act.

The following explain the conditions of the draft permit:

The special conditions of the permit serve the purpose of clarifying monitoring requirements, temperature limits, monitoring location, DMR submission, operator certification requirements, and Stormwater Pollution Prevention Plan (SWPPP) requirements.


Stepan Company
NPDES No. IL0002453
Outfall 010
Outfall 001
Outfall 011
Disposal
ROAD
Mile
280
Treat Island
Millsdale
MILLSDALE
PIPELINE
Cedar
VETTER
BR 563
Gravel
Pit
JOLIET
TRAINING AREA
JOLIE
TRAINING
0 0.5 Mi
0 2000 Ft

Public Notice of Draft Permit

Public Notice Number SMT:20052001.smt is hereby given by Illinois EPA, Division of Water Pollution Control, Permit Section, 1021 North Grand Avenue East, Post Office Box 19276, Springfield, Illinois 62794-9276 (herein Agency) that a draft National Pollutant Discharge Elimination System (NPDES) Permit Number IL0002216 has been prepared under 40 CFR 124.6(d) for Stepan Chemical, 22500 West Millsdale Road, Elwood, Illinois 60421, (Will County) for discharge into the Des Plaines River and Cedar Creek.

The applicant is engaged in the production of anionic surfactants by oleum sulfonation, sulfation and air-SO3 sulfonation, non-ionic surfactants by alkoxylation, cationic surfactants by quaternization, emulsifiers by sulfation and neutralization, phthalic anhydride by catalytic reaction, salts of sulfonated petrochemical feed stocks by neutralization, methyl esters and isopropyl esters by esterification and fractionation, drum dried and spray dried detergents, liquid detergents by batch blending, alkyamides by amidization and urethane foams and polyols by batch process (SIC 2843, 2865, 2821, 2841, 2842, 2869 and 2844) Wastewater is generated by process operations, periodically discharging the cooling tower blowdown when solids build-up, sanitary wastewater, and precipitation which contacts the site.

Plant operation results in an average discharge of 0.88 MGD of process wastewater, sanitary wastewater, cooling tower blowdown, and stormwater from outfall 001 and an intermittent discharge of stormwater from outfalls 010 and 011.

The application, draft permit and other documents are available for inspection and may be copied at the Agency between 9:30 a.m. and 3:30 p.m. Monday through Friday. A Fact Sheet containing more detailed information is available at no charge. For further information, call the Public Notice Clerk at 217/782-0610.

Interested persons are invited to submit written comments on the draft permit to the Agency at the above address. The NPDES Permit and Joint Public Notice numbers must appear on each comment page. All comments received by the Agency not later than 30 days from the date of this publication shall be considered in making the final decision regarding permit issuance.

Any interested person may submit written request for a public hearing on the draft

If written comments and/or requests indicate a significant degree of public interest in the draft permit, the permitting authority may, at its discretion, hold a public hearing. Public notice will be given 30 days before any public hearing.

NPDES Permit No. IL0002453

Illinois Environmental Protection Agency

Division of Water Pollution Control

1021 North Grand Avenue East

Post Office Box 19276

Springfield, Illinois 62794-9276

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Reissued (NPDES) Permit

Expiration Date:

Issue Date:
Effective Date:

Name and Address of Permittee:

Stepan Company
22500 Stepan Drive
Elwood, Illinois 60421

Facility Name and Address:

Stepan Company
22500 Stepan Drive
Elwood, Illinois 60421
(Will County)

Discharge Number and Name:		Receiving Waters:
001	Process Wastewater, Sanitary Wastewater, Cooling Tower Blowdown, and Stormwater	Des Plaines River
010	Stormwater	Cedar Creek
011	Stormwater	Des Plaines River

In compliance with the provisions of the Illinois Environmental Protection Act, Title 35 of Ill. Adm. Code, Subtitle C and/or Subtitle D, Chapter 1, and the Clean Water Act (CWA), the above-named permittee is hereby authorized to discharge at the above location to the above-named receiving stream in accordance with the standard conditions and attachments herein.

Permittee is not authorized to discharge after the above expiration date. In order to receive authorization to discharge beyond the expiration date, the permittee shall submit the proper application as required by the Illinois Environmental Protection Agency (IEPA) not later than 180 days prior to the expiration date.

Amy Dragovich, P.E.
Manager, Permit Section
Division of Water Pollution Control

ALD:SMT:20052001.smt

NPDES Permit No. IL0002453

Effluent Limitations and Monitoring

From the effective date of this permit until the expiration date, the effluent of the following discharge(s) shall be monitored and limited at all times as follows:

Outfall: 001 Process Wastewater, Sanitary Wastewater, Cooling Tower Blowdown, Condensate, and Stormwater (DAF = 0.88 MGD)

	LOAD LIMITS lbs/day DAF (DMF)		CONCENTRATION LIMITS mg/L			
PARAMETER	30 DAY AVERAGE	DAILY MAXIMUM	30 DAY AVERAGE	DAILY MAXIMUM	SAMPLE FREQUENCY	SAMPLE TYPE
Flow (MGD)	See Special Condition 1				Daily	Continuous
pH	See Special Condition 2				2/Week	Grab
Temperature	See Special Condition 3 and 15				2/Week	Single Reading
BOD_5	167	334	20	40	2/Week	Composite
Total Suspended Solids	209	417	25	50	2/Week	Composite
Oil and Grease	See Special Condition 4		15	30	1/Week	Mathematical Composite
Total Residual Chlorine	See Special Condition 9			0.05	2/Week	Grab
MBAS	252	510			2/Week	Composite
Acenaphthene	0.16	0.42	0.02	0.06	2/Year	Composite
Acenaphthylene	0.16	0.42	0.02	0.06	2/Year	Composite
Acrylonitrile	0.68	1.71	0.10	0.24	2/Year	Grab
Anthracene	0.16	0.42	0.02	0.06	2/Year	Composite
Benzene	0.26	0.96	0.04	0.14	2/Year	Grab
Benzo(a)anthracene	0.16	0.42	0.02	0.06	2/Year	Composite
3,4-Benzofluoranthene	0.16	0.43	0.02	0.06	2/Year	Composite
Benzo(k)fluoranthene	0.16	0.42	0.02	0.06	2/Year	Composite
Benzo(a)pyrene	0.16	0.43	0.02	0.06	2/Year	Composite
Bis(2-ethylhexyl)phthalate	0.73	1.97	0.10	0.28	2/Year	Composite
Carbon Tetrachloride	0.13	0.27	0.02	0.04	2/Year	Grab
Chlorobenzene	0.11	0.20	0.02	0.03	2/Year	Grab
Chloroethane	0.73	1.89	0.10	0.27	2/Year	Grab
Chloroform	0.15	0.32	0.02	0.05	2/Year	Grab
2-Chlorophenol	0.22	0.69	0.03	0.10	2/Year	Grab
Chrysene	0.16	0.42	0.02	0.06	2/Year	Composite

NPDES Permit No. IL0002453

Effluent Limitations and Monitoring

	LOAD LIMITS lbs/day DAF (DMF)		CONCENTRATION LIMITS mg/L			
PARAMETER	30 DAY AVERAGE	DAILY MAXIMUM	30 DAY AVERAGE	DAILY MAXIMUM	SAMPLE FREQUENCY	SAMPLE TYPE
Di-n-butyl phthalate	0.19	0.40	0.03	0.06	2/Year	Composite
Outfall 001 Continued:						
1,2-Dichlorobenzene	0.54	1.15	0.08	0.16	2/Year	Grab
1,3-Dichlorobenzene	0.22	0.31	0.03	0.04	2/Year	Grab
1,4-Dichlorobenzene	0.11	0.20	0.02	0.03	2/Year	Grab
1,1-Dichloroethane	0.16	0.42	0.02	0.06	2/Year	Grab
1,2- Dichloroethane	0.48	1.49	0.07	0.21	2/Year	Grab
1,1-Dichloroethylene	0.11	0.18	0.02	0.03	2/Year	Grab
1,2-trans- Dichloroethylene	0.15	0.38	0.02	0.05	2/Year	Grab
2,4-Dichlorophenol	0.28	0.79	0.04	0.11	2/Year	Grab
1,2-Dichloropropane	1.08	1.62	0.15	0.23	2/Year	Grab
1,3-Dichloropropylene	0.20	0.31	0.03	0.04	2/Year	Grab
Diethyl phthalate	0.57	1.43	0.08	0.20	2/Year	Composite
2,4-Dimethylphenol	0.13	0.25	0.02	0.04	2/Year	Composite
Dimethyl phthalate	0.13	0.33	0.02	0.05	2/Year	Composite
4,6-Dinitro-o-cresol	0.55	1.95	0.08	0.28	2/Year	Composite
2,4-Dinitrophenol	0.50	0.87	0.07	0.12	2/Year	Composite
2,4-Dinitrotoluene	0.80	2.01	0.11	0.29	2/Year	Composite
2,6-Dinitrotoluene	1.80	4.52	0.26	0.64	2/Year	Composite
Ethylbenzene	0.23	0.76	0.03	0.11	2/Year	Grab
Fluoranthene	0.18	0.48	0.03	0.07	2/Year	Composite
Fluorene	0.16	0.42	0.02	0.06	2/Year	Composite
Hexachlorobenzene	0.11	0.20	0.02	0.03	2/Year	Grab
Hexachlorobutadiene	0.14	0.35	0.02	0.05	2/Year	Composite
Hexachloroethane	0.15	0.38	0.02	0.05	2/Year	Grab
Methyl Chloride	0.61	1.34	0.09	0.19	2/Year	Grab
Methylene Chloride	0.28	0.63	0.04	0.09	2/Year	Grab

NPDES Permit No. IL0002453

Effluent Limitations and Monitoring

	LOAD LIMITS lbs/day DAF (DMF)		CONCENTRATION LIMITS mg/L			
PARAMETER	30 DAY AVERAGE	DAILY MAXIMUM	30 DAY AVERAGE	DAILY MAXIMUM	SAMPLE FREQUENCY	SAMPLE TYPE
Naphthalene	0.16	0.42	0.02	0.06	2/Year	Composite
Nitrobenzene	0.19	0.48	0.03	0.07	2/Year	Composite
Outfall 001 Continued:						
2-Nitrophenol	0.29	0.49	0.04	0.07	2/Year	Composite
4-Nitrophenol	0.51	0.87	0.07	0.12	2/Year	Composite
Phenanthrene	0.16	0.42	0.02	0.06	2/Year	Composite
Phenol	0.11	0.18	0.02	0.03	2/Year	Composite
Pyrene	0.18	0.47	0.03	0.07	2/Year	Composite
Tetrachloroethylene	0.16	0.40	0.02	0.06	2/Year	Grab
Toluene	0.18	0.56	0.03	0.08	2/Year	Grab
Chromium	7.9	17	1.0	2.0	2/Year	Composite
Copper	4.2	8.3	0.5	1.0	2/Year	Composite
Cyanide	0.83	1.7	0.10	0.20	2/Year	Composite
Lead	1.67	3.3	0.2	0.4	2/Year	Composite
Nickel	8.3	17	1.0	2.0	2/Year	Composite
Zinc	7.4	17	1.0	2.0	2/Year	Composite
1,2,4-Trichlorobenzene	0.48	0.99	0.07	0.14	2/Year	Grab
1,1,1-Trichloroethane	0.15	0.38	0.02	0.05	2/Year	Grab
1,1,2-Trichloroethane	0.15	0.38	0.02	0.05	2/Year	Grab
Trichloroethylene	0.15	0.38	0.02	0.05	2/Year	Grab
Vinyl Chloride	0.73	1.89	0.10	0.27	2/Year	Composite
Total Nitrogen (as N)			Monitor Only		Monthly	Grab
Total Phosphorus (as P)			Monitor Only		Monthly	Grab
Chloride	See Special Condition 13		Monitor Only		Monthly	Grab

2/Year samples shall be submitted with the June and December DMR’s.

Effluent Limitations and Monitoring

From the effective date of this permit until the expiration date, the effluent of the following discharge(s) shall be monitored and limited at all times as follows:

Outfalls: 010 North Property Stormwater (Intermittent Discharge)
011 South Property Stormwater (Intermittent Discharge)

See Special Condition 14.

Special Conditions

SPECIAL CONDITION 1. Flow shall be measured in units of Million Gallons per Day (MGD) and reported as a monthly average and a daily maximum on the Discharge Monitoring Report. The monthly average shall consist of the summation of the daily flows divided by the number of days the facility discharged during that month.

SPECIAL CONDITION 2. The pH shall be in the range 6.0 to 9.0. The monthly minimum and monthly maximum values shall be reported on the DMR form.

SPECIAL CONDITION 3. This facility is not allowed any mixing with the receiving stream in order to meet applicable water quality thermal limitations. Therefore, discharge of wastewater from this facility must meet the following thermal limitations prior to discharge into the receiving stream.

Temperatures shall not exceed 93°F (34°C) more than 5% of the time, or 100°F (37.8°C) at any time.

The monthly maximum value shall be reported on the DMR form.

SPECIAL CONDITION 4. Mathematical composites for oil, fats and grease shall consist of a series of grab samples collected over any 24 hour consecutive period. Each sample shall be analyzed separately and the arithmetic mean of all grab samples collected during a 24-hour period shall constitute a mathematical composite. No single grab sample shall exceed a concentration of 75 mg/L. Testing for oil and grease shall be in accordance with approved procedures listed under 40 CFR 136 to determine compliance with the load limitations established in this permit. The samples may be further separated into polar and nonpolar fractions to determine compliance with the concentration limits established in this permit.

SPECIAL CONDITION 5. Samples taken in compliance with the effluent monitoring requirements shall be taken at a point representative of the discharge, but prior to entry into the receiving stream.

SPECIAL CONDITION 6. The Permittee shall record monitoring results on Discharge Monitoring Report (DMR) electronic forms using one such form for each outfall each month.

In the event that an outfall does not discharge during a monthly reporting period, the DMR Form shall be submitted with no discharge indicated.

The Permittee is required to submit electronic DMRs (NetDMRs) instead of mailing paper DMRs to the IEPA unless a waiver has been granted by the Agency. More information, including registration information for the NetDMR program, can be obtained on the IEPA website, https://www2.illinois.gov/epa/topics/water-quality/surface-water/netdmr/Pages/quick-answer-guide.aspx

The completed Discharge Monitoring Report forms shall be submitted to IEPA no later than the 25th day of the following month, unless otherwise specified by the permitting authority.

Permittees that have been granted a waiver shall mail Discharge Monitoring Reports with an original signature to the IEPA at the following address:

Illinois Environmental Protection Agency
Division of Water Pollution Control
Attention: Compliance Assurance Section, Mail Code # 19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 7. If an applicable effluent standard or limitation is promulgated under Sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a)(2) of the Clean Water Act and that effluent standard or limitation is more stringent than any effluent limitation in the permit or controls a pollutant not limited in the NPDES Permit, the Agency shall revise or modify the permit in accordance with the more stringent standard or prohibition and shall so notify the permittee.

SPECIAL CONDITION 8. The use or operation of this facility shall be by or under the supervision of a Certified Class K operator.

SPECIAL CONDITION 9. All samples for total residual chlorine (TRC) shall be analyzed by an applicable method contained in 40 CFR 136, equivalent in accuracy to low-level amperometric titration. Any analytical variability of the method used shall be considered when determining the accuracy and precision of the results obtained.

SPECIAL CONDITION 10. The Agency has determined that the effluent limitations in this permit constitute BAT/BCT storm water which is treated in the existing treatment facilities for purposes of this permit reissuance, and no pollution prevention plan will be required for such storm water discharged from outfall 001. In addition to the chemical specific monitoring required elsewhere in this permit, the permittee shall conduct an annual inspection of the facility site to identify areas contributing to a storm water discharge associated with industrial activity, and determine whether any facility modifications have occurred which result in previously-treated storm water

discharges no longer receiving treatment. If any such discharges are identified the permittee shall request a modification of this permit within 30 days after the inspection. Records of the annual inspection shall be retained by the permittee for the term of this permit and be made available to the Agency on request. The annual inspection may be combined with annual inspection required by special condition 13.

SPECIAL CONDITION 11. In the event that the permittee must request a change in the use of water treatment additives, the permittee must request a change in this permit in accordance with Standard Conditions - - Attachment H.

SPECIAL CONDITION 12. The Permittee shall monitor the effluent from outfall 001 for the following parameters on a semi-annual basis. Sampling data for a specific parameter required by other conditions of this permit may be used to satisfy this sampling requirement. This Permit may be modified with public notice to establish effluent limitations if appropriate, based on information obtained through sampling. The sample shall be a 24-hour effluent composite except as otherwise specifically provided below and the results shall be submitted to the address in special condition 6 in June and December. The parameters to be sampled and the minimum reporting limits to be attained are as follows:

STORET CODE	PARAMETER	Minimum reporting limit
01002	Arsenic	0.05 mg/L
01007	Barium	0.5 mg/L
01027	Cadmium	0.001 mg/L
01032	Chromium (hexavalent) (grab)	0.01 mg/L
01034	Chromium (total)	0.05 mg/L
01042	Copper	0.005 mg/L
00718	Cyanide (grab) (available *** or amendable to chlorination)	5.0 ug/L
00720	Cyanide (grab not to exceed 24 hours) (total)	5.0 ug/L
00951	Fluoride	0.1 mg/L
01045	Iron (total)	0.5 mg/L
01046	Iron (Dissolved)	0.5 mg/L
01051	Lead	0.05 mg/L
01055	Manganese	0.5 mg/L
71900	Mercury (grab)**	1.0 ng/L*
01067	Nickel	0.005 mg/L
00550	Oil (hexane soluble or equivalent) (Grab Sample only)	5.0 mg/L
32730	Phenols (grab)	0.005 mg/L
01147	Selenium	0.005 mg/L
01077	Silver (total)	0.003 mg/L
01092	Zinc	0.025 mg/L

Unless otherwise indicated, concentrations refer to the total amount of the constituent present in all phases, whether solid, suspended or dissolved, elemental or combined, including all oxidation states.

*1.0 ng/L = 1 part per trillion.
**Utilize USEPA Method 1631E and the digestion procedure described in Section 11.1.1.2 of 1631E.
***USEPA Method OIA-1677

SPECIAL CONDITION 13. Stepan (IL0002453) timely filed a Time-Limited Water Quality Standard (TLWQS) for chloride (Case # PCB 2019-018) and is participating in the chloride workgroup for the Lower Des Plaines dischargers. Since the Permittee timely filed, the chloride water quality standard is stayed. Stepan must continue to participate in the workgroup and must comply with the Board Order resulting from the TLWQS (Case # PCB 2019-018).

SPECIAL CONDITION 14.

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

A. A storm water pollution prevention plan shall be maintained by the permittee for the storm water associated with industrial activity at this facility tributary to outfalls 010 and 011. The plan shall identify potential sources of pollution which may be expected to affect the quality of storm water discharges associated with the industrial activity at the facility. In addition, the plan shall describe and ensure the implementation of practices which are to be used to reduce the pollutants in storm water discharges associated with industrial activity at the facility and to assure compliance with the terms and conditions of this permit. The permittee shall modify the plan if substantive changes are made or occur affecting compliance with this condition.

1. Waters not classified as impaired pursuant to Section 303(d) of the Clean Water Act.

   Unless otherwise specified by federal regulation, the storm water pollution prevention plan shall be designed for a storm event equal to or greater than a 25-year 24-hour rainfall event.

Special Conditions

2. Waters classified as impaired pursuant to Section 303(d) of the Clean Water Act

   For any site which discharges directly to an impaired water identified in the Agency's 303(d) listing, and if any parameter in the subject discharge has been identified as the cause of impairment, the storm water pollution prevention plan shall be designed for a storm event equal to or greater than a 25-year 24-hour rainfall event. If required by federal regulations, the storm water pollution prevention plan shall adhere to a more restrictive design criteria.

B. The operator or owner of the facility shall make a copy of the plan available to the Agency at any reasonable time upon request.

   Facilities which discharge to a municipal separate storm sewer system shall also make a copy available to the operator of the municipal system at any reasonable time upon request.

C. The permittee may be notified by the Agency at any time that the plan does not meet the requirements of this condition. After such notification, the permittee shall make changes to the plan and shall submit a written certification that the requested changes have been made. Unless otherwise provided, the permittee shall have 30 days after such notification to make the changes.

D. The discharger shall amend the plan whenever there is a change in construction, operation, or maintenance which may affect the discharge of significant quantities of pollutants to the waters of the State or if a facility inspection required by paragraph H of this condition indicates that an amendment is needed. The plan should also be amended if the discharger is in violation of any conditions of this permit, or has not achieved the general objective of controlling pollutants in storm water discharges. Amendments to the plan shall be made within 30 days of any proposed construction or operational changes at the facility, and shall be provided to the Agency for review upon request.

E. The plan shall provide a description of potential sources which may be expected to add significant quantities of pollutants to storm water discharges, or which may result in non-storm water discharges from storm water outfalls at the facility. The plan shall include, at a minimum, the following items:

   1. A topographic map extending one-quarter mile beyond the property boundaries of the facility, showing: the facility, surface water bodies, wells (including injection wells), seepage pits, infiltration ponds, and the discharge points where the facility's storm water discharges to a municipal storm drain system or other water body. The requirements of this paragraph may be included on the site map if appropriate. Any map or portion of map may be withheld for security reasons.

   2. A site map showing:

      i. The storm water conveyance and discharge structures;

      ii. An outline of the storm water drainage areas for each storm water discharge point;

      iii. Paved areas and buildings;

      iv. Areas used for outdoor manufacturing, storage, or disposal of significant materials, including activities that generate significant quantities of dust or particulates.

      v. Location of existing storm water structural control measures (dikes, coverings, detention facilities, etc.);

      vi. Surface water locations and/or municipal storm drain locations

      vii. Areas of existing and potential soil erosion;

      viii. Vehicle service areas;

      ix. Material loading, unloading, and access areas.

      x. Areas under items iv and ix above may be withheld from the site for security reasons.

   3. A narrative description of the following:

      i. The nature of the industrial activities conducted at the site, including a description of significant materials that are treated, stored or disposed of in a manner to allow exposure to storm water;

      ii. Materials, equipment, and vehicle management practices employed to minimize contact of significant materials with storm water discharges;

      iii. Existing structural and non-structural control measures to reduce pollutants in storm water discharges;

      iv. Industrial storm water discharge treatment facilities;

      v. Methods of onsite storage and disposal of significant materials.

Special Conditions

4. A list of the types of pollutants that have a reasonable potential to be present in storm water discharges in significant quantities. Also provide a list of any pollutant that is listed as impaired in the most recent 303(d) report.

5. An estimate of the size of the facility in acres or square feet, and the percent of the facility that has impervious areas such as pavement or buildings.

6. A summary of existing sampling data describing pollutants in storm water discharges.

F. The plan shall describe the storm water management controls which will be implemented by the facility. The appropriate controls shall reflect identified existing and potential sources of pollutants at the facility. The description of the storm water management controls shall include:

1. Storm Water Pollution Prevention Personnel - Identification by job titles of the individuals who are responsible for developing, implementing, and revising the plan.

2. Preventive Maintenance - Procedures for inspection and maintenance of storm water conveyance system devices such as oil/water separators, catch basins, etc., and inspection and testing of plant equipment and systems that could fail and result in discharges of pollutants to storm water.

3. Good Housekeeping - Good housekeeping requires the maintenance of clean, orderly facility areas that discharge storm water. Material handling areas shall be inspected and cleaned to reduce the potential for pollutants to enter the storm water conveyance system.

4. Spill Prevention and Response - Identification of areas where significant materials can spill into or otherwise enter the storm water conveyance systems and their accompanying drainage points. Specific material handling procedures, storage requirements, spill clean up equipment and procedures should be identified, as appropriate. Internal notification procedures for spills of significant materials should be established.

5. Storm Water Management Practices - Storm water management practices are practices other than those which control the source of pollutants. They include measures such as installing oil and grit separators, diverting storm water into retention basins, etc. Based on assessment of the potential of various sources to contribute pollutants, measures to remove pollutants from storm water discharge shall be implemented. In developing the plan, the following management practices shall be considered:

   i. Containment - Storage within berms or other secondary containment devices to prevent leaks and spills from entering storm water runoff. To the maximum extent practicable storm water discharged from any area where material handling equipment or activities, raw material, intermediate products, final products, waste materials, by-products, or industrial machinery are exposed to storm water should not enter vegetated areas or surface waters or infiltrate into the soil unless adequate treatment is provided.

   ii. Oil & Grease Separation - Oil/water separators, booms, skimmers or other methods to minimize oil contaminated storm water discharges.

   iii. Debris & Sediment Control - Screens, booms, sediment ponds or other methods to reduce debris and sediment in storm water discharges.

   iv. Waste Chemical Disposal - Waste chemicals such as antifreeze, degreasers and used oils shall be recycled or disposed of in an approved manner and in a way which prevents them from entering storm water discharges.

   v. Storm Water Diversion - Storm water diversion away from materials manufacturing, storage and other areas of potential storm water contamination. Minimize the quantity of storm water entering areas where material handling equipment of activities, raw material, intermediate products, final products, waste materials, by-products, or industrial machinery are exposed to storm water using green infrastructure techniques where practicable in the areas outside the exposure area, and otherwise divert storm water away from exposure area.

   vi. Covered Storage or Manufacturing Areas - Covered fueling operations, materials manufacturing and storage areas to prevent contact with storm water.

   vii. Storm Water Reduction - Install vegetation on roofs of buildings within adjacent to the exposure area to detain and evapotranspirate runoff where precipitation falling on the roof is not exposed to contaminants, to minimize storm water runoff; capture storm water in devices that minimize the amount of storm water runoff and use this water as appropriate based on quality.

6. Sediment and Erosion Prevention - The plan shall identify areas which due to topography, activities, or other factors, have a high potential for significant soil erosion. The plan shall describe measures to limit erosion.

7. Employee Training - Employee training programs shall inform personnel at all levels of responsibility of the components and

Special Conditions

goals of the storm water pollution control plan. Training should address topics such as spill response, good housekeeping and material management practices. The plan shall identify periodic dates for such training.

8. Inspection Procedures - Qualified plant personnel shall be identified to inspect designated equipment and plant areas. A tracking or follow-up procedure shall be used to ensure appropriate response has been taken in response to an inspection. Inspections and maintenance activities shall be documented and recorded.

G. Non-Storm Water Discharge - The plan shall include a certification that the discharge has been tested or evaluated for the presence of non-storm water discharge. The certification shall include a description of any test for the presence of non-storm water discharges, the methods used, the dates of the testing, and any onsite drainage points that were observed during the testing. Any facility that is unable to provide this certification must describe the procedure of any test conducted for the presence of non-storm water discharges, the test results, potential sources of non-storm water discharges to the storm sewer, and why adequate tests for such storm sewers were not feasible.

H. Quarterly Visual Observation of Discharges - The requirements and procedures of quarterly visual observations are applicable to all outfalls covered by this condition.

1. You must perform and document a quarterly visual observation of a storm water discharge associated with industrial activity from each outfall. The visual observation must be made during daylight hours. If no storm event resulted in runoff during daylight hours from the facility during a monitoring quarter, you are excused from the visual observations requirement for that quarter, provided you document in your records that no runoff occurred. You must sign and certify the document.

2. Your visual observation must be made on samples collected as soon as practical, but not to exceed 1 hour or when the runoff or snow melt begins discharging from your facility. All samples must be collected from a storm event discharge that is greater than 0.1 inch in magnitude and that occurs at least 72 hours from the previously measureable (greater than 0.1 inch rainfall) storm event. The observation must document: color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, and other obvious indicators of storm water pollution. If visual observations indicate any unnatural color, odor, turbidity, floatable material, oil sheen or other indicators of storm water pollution, the permittee shall obtain a sample and monitor for the parameter or the list of pollutants in Part E.4.

3. You must maintain your visual observation reports onsite with the SWPPP. The report must include the observation date and time, inspection personnel, nature of the discharge (i.e., runoff or snow melt), visual quality of the storm water discharge (including observations of color, odor, floating solids, settled solids, suspended solids, foam, oil sheen, and other obvious indicators of storm water pollution), and probable sources of any observed storm water contamination.

4. You may exercise a waiver of the visual observation requirement at a facility that is inactive or unstaffed, as long as there are no industrial materials or activities exposed to storm water. If you exercise this waiver, you must maintain a certification with your SWPPP stating that the site is inactive and unstaffed, and that there are no industrial materials or activities exposed to storm water.

5. Representative Outfalls - If your facility has two or more outfalls that you believe discharge substantially identical effluents, based on similarities of the industrial activities, significant materials, size of drainage areas, and storm water management practices occurring within the drainage areas of the outfalls, you may conduct visual observations of the discharge at just one of the outfalls and report that the results also apply to the substantially identical outfall(s).

6. The visual observation documentation shall be made available to the Agency and general public upon written request.

I. The permittee shall conduct an annual facility inspection to verify that all elements of the plan, including the site map, potential pollutant sources, and structural and non-structural controls to reduce pollutants in industrial storm water discharges are accurate. Observations that require a response and the appropriate response to the observation shall be retained as part of the plan. Records documenting significant observations made during the site inspection shall be submitted to the Agency in accordance with the reporting requirements of this permit.

J. This plan should briefly describe the appropriate elements of other program requirements, including Spill Prevention Control and Countermeasures (SPCC) plans required under Section 311 of the CWA and the regulations promulgated thereunder, and Best Management Programs under 40 CFR 125.100.

K. The plan is considered a report that shall be available to the public at any reasonable time upon request. The permittee may claim portions of the plan as confidential business information, including any portion describing facility security measures.

L. The plan shall include the signature and title of the person responsible for preparation of the plan and include the date of initial preparation and each amendment thereto.

M. Facilities which discharge storm water associated with industrial activity to municipal separate storm sewers may also be subject to additional requirement imposed by the operator of the municipal system

Special Conditions

Construction Authorization

Authorization is hereby granted to construct treatment works and related equipment that may be required by the Storm Water Pollution Prevention Plan developed pursuant to this permit.

This Authorization is issued subject to the following condition(s).

N. If any statement or representation is found to be incorrect, this authorization may be revoked and the permittee there upon waives all rights thereunder.

O. The issuance of this authorization (a) does not release the permittee from any liability for damage to persons or property caused by or resulting from the installation, maintenance or operation of the proposed facilities; (b) does not take into consideration the structural stability of any units or part of this project; and (c) does not release the permittee from compliance with other applicable statutes of the State of Illinois, or other applicable local law, regulations or ordinances.

P. Plans and specifications of all treatment equipment being included as part of the stormwater management practice shall be included in the SWPPP.

Q. Construction activities which result from treatment equipment installation, including clearing, grading and excavation activities which result in the disturbance of one acre or more of land area, are not covered by this authorization. The permittee shall contact the IEPA regarding the required permit(s).

REPORTING

R. The facility shall submit a copy of the annual inspection report to the Illinois Environmental Protection Agency. The report shall include results of the annual facility inspection which is required by Part I of this condition. The report shall also include documentation of any event (spill, treatment unit malfunction, etc.) which would require an inspection, results of the inspection, and any subsequent corrective maintenance activity. The report shall be completed and signed by the authorized facility employee(s) who conducted the inspection(s). The annual inspection report is considered a public document that shall be available at any reasonable time upon request.

S. The first report shall contain information gathered during the one year time period beginning with the effective date of coverage under this permit and shall be submitted no later than 60 days after this one year period has expired. Each subsequent report shall contain the previous year's information and shall be submitted no later than one year after the previous year's report was due.

T. If the facility performs inspections more frequently than required by this permit, the results shall be included as additional information in the annual report.

U. The permittee shall retain the annual inspection report on file at least 3 years. This period may be extended by request of the Illinois Environmental Protection Agency at any time.

V. Annual inspection reports shall be submitted to one of the following addresses:

   a. Electronic Annual Reports should be submitted to

      epa.indannualinsp@illinois.gov

   b. If electronic submittal is unavailable, reports should be mailed to:

      Illinois Environmental Protection Agency
      Division of Water Pollution Control
      Compliance Assurance Section, Mail Code #19
      Annual Inspection Report
      1021 North Grand Avenue East
      Post Office Box 19276
      Springfield, Illinois 62794-9276

W. The permittee shall notify any regulated small municipal separate storm sewer owner (MS4 Community) that they maintain coverage under an individual NPDES permit. The permittee shall submit any SWPPP or any annual inspection to the MS4 community upon request by the MS4 community.

SPECIAL CONDITION 15.

The permittee shall demonstrate compliance with 35 Ill. Adm. Code 302.211, relief granted in accordance with Section 316(a) of the Clean Water Act, or other thermal relief granted by the Illinois Pollution Control Board and approved by USEPA, five years from the effective date of this permit. After five years, the permittee shall file a modification request with the Agency based on the method of compliance determined according to the schedule below.

Special Conditions

	ITEM	COMPLETION DATE
1	Develop a plan to further characterize the heat balance of the existing wastewater system. Plan shall include list of potential sources, monitoring plan including sample points, sample events, and monitoring criteria. The collected data will be used to produce a detailed heat/materials balance for the wastewater system. The plan will also include a plan for review of available upstream receiving stream data and addressing related data gaps. The receiving stream data will be used to assess the available thermal assimilative capacity.	2 months from effective date of the NPDES permit
2	Execute the monitoring plan to define the heat/material balance for all wastewater unit operations including upstream waste sources. Monitoring will include both winter and summer months to account for seasonal variability. Related to the receiving stream, publicly available information will be compiled and if needed, in-stream monitoring executed.	14 months from effective date of the NPDES permit
3	Issue a report summarizing the results of the monitoring plans, including upstream sources and full heat/material balance model for the wastewater treatment operations. The report will summarize findings for the receiving water available thermal assimilative capacity. A "reasonable potential to exceed" evaluation will be conducted. The report shall be submitted to Illinois EPA.	17 months from effective date of the NPDES permit
4	Develop a plan to develop a design basis for evaluating compliance options. Plan shall include list of engineering options, operational modifications, and outfall modifications to be considered. Treatability and/or modeling plans will be developed to confirm compliance options.	18 months from effective date of the NPDES permit
5	Perform mixing zone modeling, perform temperature modeling, perform treatability testing, and develop a design basis for compliance options analysis.	21 months from effective date of the NPDES permit
6	Perform compliance options evaluation. Issue a report of summarizing the compliance options evaluation. Report shall include order of magnitude costs for compliance for each option and the proposed option selected to achieve long-term compliance. The report shall be submitted to Illinois EPA.	24 months from effective date of the NPDES permit
7	Review compliance options evaluation report and select a compliance option. Provide notification of selected option to IEPA. Submit details of selected option as required by the Permit.	25 months from effective date of the NPDES permit
8	Develop a preliminary design package	28 months from effective date of the NPDES permit
9	Apply for and obtain needed permits/approvals.	31 months from effective date of the NPDES permit
10	Develop and issue a request for proposal to perform detail design for the approved compliance option. Select design engineering firm.	33 months from effective date of the NPDES permit
11	Perform detail design of compliance option and develop bid package for construction and equipment procurement.	39 months from effective date of the NPDES permit
12	Commence construction;	42 months from effective date of the NPDES permit
13	Complete construction.	50 months from effective date of the NPDES permit
14 15	Complete equipment startup. Comply with final limits.	52 months from effective date of the NPDES permit

Special Conditions

After the compliance schedule is completed, the permittee shall meet the temperature condition as following:

This facility is not allowed any mixing with the receiving stream in order to meet applicable water quality thermal limitations. Therefore, discharge of wastewater from this facility must meet the following thermal limitations prior to discharge into the receiving stream.

A. The discharge must not exceed the maximum limits in the following table during more than one percent of the hours in the 12 month period ending with any month. Moreover, at no time shall the water temperature of the discharge exceed the maximum limits in the following table by more than 1.7°C (3°F).

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
°F	60	60	60	90	90	90	90	90	90	90	90	60
°C	16	16	16	32	32	32	32	32	32	32	32	16

B. In addition, the discharge shall not cause abnormal temperature changes that may adversely affect aquatic life unless caused by natural conditions.

C. The discharge shall not cause the maximum temperature rise above natural temperatures to exceed 2.8°C (5°F).

Reporting

The permittee shall submit an update of the schedule every six-months from the effective date of this permit, indicating, a) the date any item was completed, or b) that the item was not completed. The report shall be mailed to IEPA at the following address:

Illinois Environmental Protection Agency
Bureau of Water
Water Quality Standards Unit, Mail Code # 15
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

Excerpt from EPA-HQ-OW-2021-0547-0243

PSC_CODE	PSC_Name	SICCODE	HUC12	EXTERNAL_PERMIT_NMBR	POLLUTANT_CODE	POLLUTANT_DESC	PARAMETER_CODE	PARAMETER_DESC	LIMIT_VALUE_QUALIFIER_CODE	Limit_value_	DMR_VALUE_QUALIFIER_CODE	DMR_value	STANDARD_UNIT_DESC	MONITORING_PERIOD_END_DATE	NODI_CODE	Parameter_Categories	TRI_Chems	CWA_Prio_poll	EXCEEDENCE_PCT	DMR_value_quantity	Reported_Calculated
419	Petroleum refining	2911	7.01E+10	MN0000418	2817	Nitrogen	600	Nitrogen, total (as N)			=	4.6	mg/L	3/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	2911	7.01E+10	MN0000418	2817	Nitrogen	600	Nitrogen, total (as N)			=	5	mg/L	9/30/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	2911	8.03E+10	MS0034711	2817	Nitrogen	600	Nitrogen, total [as N]			=	5.697804	kg/d	11/30/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants		11.0776	Calc
419	Petroleum refining	2911	8.03E+10	MS0034711	2817	Nitrogen	600	Nitrogen, total [as N]			=	6.001322	kg/d	6/30/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants		8.853	Calc
419	Petroleum refining	2911	8.03E+10	MS0034711	2817	Nitrogen	600	Nitrogen, total [as N]			=	7.796233	kg/d	12/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants		17.1612	Calc
419	Petroleum refining	2911	8.03E+10	MS0034711	2817	Nitrogen	600	Nitrogen, total [as N]			=	9.510194	kg/d	10/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants		14.7096	Calc
419	Petroleum refining	2911	8.03E+10	MS0034711	2817	Nitrogen	600	Nitrogen, total [as N]			=	9.987612	kg/d	8/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants		16.4348	Calc
419	Petroleum refining	2911	8.03E+10	MS0034711	2817	Nitrogen	600	Nitrogen, total [as N]			=	10.23368	kg/d	9/30/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants		16.0262	Calc
419	Petroleum refining	2911	8.03E+10	MS0034711	2817	Nitrogen	600	Nitrogen, total [as N]			=	46.9129	kg/d	7/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants		72.6854	Calc
419	Petroleum refining	2911	8.09E+10	LA0054216	2817	Nitrogen	600	Nitrogen, total (as N)			=	0.57	mg/L	6/30/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	2911	8.09E+10	LA0054216	2817	Nitrogen	600	Nitrogen, total (as N)			=	0.69	mg/L	12/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	2911	1.01E+11	MT0000264	2817	Nitrogen	600	Nitrogen, total [as N]			=	5.203708	kg/d	9/30/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants		26.39556	Calc
419	Petroleum refining	2911	1.01E+11	MT0000264	2817	Nitrogen	600	Nitrogen, total [as N]			=	6.914921	kg/d	8/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants		32.71978	Calc
419	Petroleum refining	2911	1.01E+11	MT0000264	2817	Nitrogen	600	Nitrogen, total [as N]			=	7.770937	kg/d	10/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants		35.5936	Calc
419	Petroleum refining	2911	1.02E+11	WY0000442	375	Ammonia as N	609	Ammonia nitrogen, total, (as N) 30 day	<=	1.98			mg/L	4/30/2019	B	Nitrogen	Include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	2911	1.02E+11	WY0000442	375	Ammonia as N	609	Ammonia nitrogen, total, (as N) 30 day	<=	1.98	=	0.09	mg/L	5/31/2019		Nitrogen	Include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	2911	1.02E+11	WY0000442	375	Ammonia as N	609	Ammonia nitrogen, total, (as N) 30 day	<=	1.98	=	0.135	mg/L	6/30/2019		Nitrogen	Include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	2911	1.03E+11	KS0100749	2817	Nitrogen	600	Nitrogen, total (as N)			=	3.1	mg/L	11/30/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	2911	1.03E+11	KS0100749	2817	Nitrogen	600	Nitrogen, total (as N)			=	4	mg/L	6/30/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	2911	1.03E+11	KS0100749	2817	Nitrogen	600	Nitrogen, total (as N)			=	8.4	mg/L	8/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	2911	1.03E+11	KS0100749	2817	Nitrogen	600	Nitrogen, total (as N)			=	8.5	mg/L	7/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	2911	1.03E+11	KS0100749	2817	Nitrogen	600	Nitrogen, total (as N)			=	8.6	mg/L	5/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	2911	1.03E+11	KS0100749	2817	Nitrogen	600	Nitrogen, total (as N)			=	8.8	mg/L	9/30/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	2911	1.03E+11	KS0100749	2817	Nitrogen	600	Nitrogen, total (as N)			=	9.7	mg/L	10/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	2911	1.03E+11	KS0100749	2817	Nitrogen	600	Nitrogen, total (as N)			=	16.3	mg/L	3/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	2911	1.03E+11	KS0100749	2817	Nitrogen	600	Nitrogen, total (as N)			=	16.4	mg/L	1/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	2911	1.03E+11	KS0100749	2817	Nitrogen	600	Nitrogen, total (as N)			=	18	mg/L	2/28/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	2911	1.03E+11	KS0100749	2817	Nitrogen	600	Nitrogen, total (as N)			=	19.8	mg/L	12/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	2911	1.03E+11	KS0100749	2817	Nitrogen	600	Nitrogen, total (as N)			=	22.9	mg/L	4/30/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	0.31	mg/L	10/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	0.39	mg/L	11/30/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	0.43	mg/L	10/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	0.5	mg/L	4/30/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	0.69	mg/L	6/30/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted

Excerpt from EPA-HQ-OW-2021-0547-0243

PSC_CODE	PSC_Name	SICCODE	HUC12	EXTERNAL_PERMIT_NMBR	POLLUTANT_CODE	POLLUTANT_DESC	PARAMETER_CODE	PARAMETER_DESC	LIMIT_VALUE_QUALIFIER_CODE	Limit_value_	DMR_VALUE_QUALIFIER_CODE	DMR_value	STANDARD_UNIT_DESC	MONITORING_PERIOD_END_DATE	NODI_CODE	Parameter_Categories	TRI_Chems	CWA_Prio_poll	EXCEEDENCE_PCT	DMR_value_quantity	Reported_Calculated
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	0.69	mg/L	7/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	0.8	mg/L	12/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	0.82	mg/L	12/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	0.86	mg/L	6/30/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	0.92	mg/L	4/30/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	0.94	mg/L	7/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	0.98	mg/L	5/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	1.3	mg/L	1/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	1.3	mg/L	2/28/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	1.4	mg/L	11/30/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	1.5	mg/L	1/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	1.5	mg/L	3/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	1.6	mg/L	3/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	1.7	mg/L	2/28/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	1.7	mg/L	8/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	2.2	mg/L	5/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.03E+10	NY0008109	2817	Nitrogen	600	Nitrogen, total (as N)			=	3	mg/L	8/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.07E+10	VA0001872	2817	Nitrogen	600	Nitrogen, total (as N)			=	0.57	mg/L	6/30/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	2.07E+10	VA0001872	2817	Nitrogen	600	Nitrogen, total (as N)			=	0.92	mg/L	12/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	5.03E+10	WV0116866	2817	Nitrogen	600	Nitrogen, total (as N)				0	mg/L	3/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	5.11E+10	KY0093858	2817	Nitrogen	600	Nitrogen, total (as N)					mg/L	1/31/2019	B	Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	5.11E+10	KY0093858	2817	Nitrogen	600	Nitrogen, total (as N)					mg/L	3/31/2019	B	Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	5.11E+10	KY0093858	2817	Nitrogen	600	Nitrogen, total (as N)					mg/L	4/30/2019	B	Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	5.11E+10	KY0093858	2817	Nitrogen	600	Nitrogen, total (as N)					mg/L	5/31/2019	B	Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	5.11E+10	KY0093858	2817	Nitrogen	600	Nitrogen, total (as N)					mg/L	6/30/2019	B	Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	5.11E+10	KY0093858	2817	Nitrogen	600	Nitrogen, total (as N)					mg/L	8/31/2019	B	Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	5.11E+10	KY0093858	2817	Nitrogen	600	Nitrogen, total (as N)					mg/L	12/31/2019	B	Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	5.11E+10	KY0093858	2817	Nitrogen	600	Nitrogen, total (as N)			=	10	mg/L	10/31/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted
419	Petroleum refining	5171	5.11E+10	KY0093858	2817	Nitrogen	600	Nitrogen, total (as N)			=	12	mg/L	11/30/2019		Nitrogen	Do not include TRI Chemicals	Do not include Priority Pollutants			Repted

United States
Environmental Protection
Agency

Preliminary Effluent Guidelines Program Plan 15

September 2021

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U.S. Environmental Protection Agency
Office of Water (4303T)
1200 Pennsylvania Avenue, NW
Washington, DC 20460

EPA-821-R-21-003

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1. EXECUTIVE SUMMARY

EPA prepares Preliminary Effluent Guidelines Program Plans pursuant to Clean Water Act (CWA) section 304(m). Preliminary plans provide a description of the EPA's annual review of effluent guidelines and pretreatment standards, consistent with CWA sections 301(d), 304(b), 304(g), 304(m), and 307(b). From these reviews, preliminary plans identify any new or existing industrial categories selected for effluent guidelines or pretreatment standards rulemakings and provide a schedule for such rulemakings. In addition, preliminary plans present any new or existing categories of industry selected for further review and analysis.

This Preliminary Effluent Guidelines Program Plan 15 (Preliminary Plan 15) discusses EPA's 2020 annual review of effluent guidelines and pretreatment standards, presents its preliminary review of specific categories identified through the review, and provides an update on the analyses and tools that EPA is continuing to develop to improve its annual review and biennial planning process.

Preliminary Plan 15 announces that EPA is initiating three new rulemakings. After several years of collecting and analyzing data, EPA has determined that revision of the following effluent guidelines or pretreatment standards are warranted:

- Meat and Poultry Products Category to address nutrient discharges (see Section 6.2 for additional details)
- Organic Chemicals, Plastics & Synthetic Fibers Category to address Per- and Polyfluoroalkyl Substances (PFAS) discharges (see Section 6.4 for additional details)
- Metal Finishing Category to address Per- and Polyfluoroalkyl Substances (PFAS) discharges (see Section 6.4 for additional details)

Preliminary Plan 15 also discusses ongoing efforts related to the Steam Electric Power Generating category rulemaking (see Section 7.1 for additional details) that the agency announced on July 26, 2021. At that time, EPA announced that the agency was initiating a rulemaking process to strengthen certain wastewater pollution discharge limitations for coal power plants that use steam to generate electricity.

Finally, Preliminary Plan 15 provides updates on ongoing point source category studies of the Electrical and Electronic Components Category and the Preliminary Multi-Industry PFAS study and announces no further action on oil and gas extraction wastewater management. Additionally, initial results from reviews of readily available data are discussed for the Metal Products and Machinery, Explosives Manufacturing, Canned and Preserved Seafood, Sugar Processing, Soap and Detergent Manufacturing, and Landfill Point Source Categories.

EPA solicits comments on the entirety of Preliminary Plan 15, particularly on its reviews of industrial wastewater discharges and treatment technologies that are described in Section 5 of this plan. This includes the 2020 annual review, which consisted of a cross-category concentration rankings analysis and preliminary review of specific, high-ranking point source categories. Along with any new comments, commenters who have previously provided relevant comments or rulemaking petitions must resubmit them for EPA to consider these comments in the context of Preliminary Plan 15.

2. BACKGROUND

This section explains how the Effluent Guidelines Program fits into EPA's National Water Program, provides an overview of the Effluent Guidelines Program, and summarizes EPA's procedures for revising and developing effluent limitations guidelines and standards (ELGs) (i.e., the effluent guidelines planning process).

2.1 The Clean Water Act and the Effluent Guidelines Program

The CWA is focused on two types of controls for point source discharges of pollutants to waters of the United States: (1) technology-based controls, based on ELGs and (2) water-quality-based controls, based on applicable water quality standards.

The CWA directs EPA to promulgate technology-based ELGs that reflect pollutant reductions achievable in categories or subcategories of industrial point sources through implementation of available treatment technologies.[1] ELGs apply to pollutants discharged from industrial facilities to surface water (direct discharges) and to publicly owned treatment works (POTWs) (indirect discharges). EPA's technology-based standards ensure that industrial facilities with similar characteristics will, at a minimum, meet similar effluent guidelines or pretreatment standards representing the performance of the "best" pollution control technologies, regardless of their location or the nature of their receiving water or POTW into which they discharge.

The CWA also gives states the primary responsibility for establishing, reviewing, and revising water quality standards. Effluent guidelines are not specifically designed to ensure that regulated discharges meet the water quality standards of the receiving water body. For this reason, while technology-based ELGs in discharge permits may meet or exceed water quality standards, the CWA also requires EPA and authorized states to establish water quality-based effluent limitations as stringent as necessary to meet water quality standards.[2] Water-quality-based limitations may require industrial facilities to meet standards that are more stringent than those in the ELGs.

To date, EPA has promulgated ELGs for 59 industrial categories. See EPA's Industrial Effluent Guidelines webpage[3] for more information. These ELGs apply to between 35,000 and 45,000 U.S. direct dischargers, as well as to another 129,000 facilities that discharge to POTWs. Based on pollutant reduction estimates from each ELG, EPA estimates that the regulations altogether prevent the discharge of over 700 billion pounds of pollutants annually.[4]

2.2 Effluent Limitations Guidelines and Pretreatment Standards Overview

EPA promulgates technology-based limitations for conventional, toxic, and nonconventional pollutants in accordance with six statutorily prescribed levels of control (Table 2-1). The limitations are based on performance of specific technologies, but the regulations do not require use of a specific control

[1] See 33 U.S.C. 1311(b) and 1314(b).

[2] See 33 U.S.C. 1311(b)(1)(C).

[3] See https://www.epa.gov/eg/industrial-effluent-guidelines.

[4] Based on the difference between discharges from each point source category before ELG promulgation and the estimated (lower) volume of discharges from each point source category after promulgation (from review of ELG development documents).

technology to achieve the limitations. For more information, see EPA's Learn about Effluent Guidelines webpage.[5]

The CWA specifies different levels of control based on the type of pollutant at issue (i.e., conventional, toxic, or nonconventional). CWA section 304(a)(4) designates the following as conventional pollutants: biochemical oxygen demand (BOD_5), total suspended solids, fecal coliform, pH, and any additional pollutants defined by the Administrator as conventional. The Administrator designated oil and grease as an additional conventional pollutant on July 30, 1979.[6] EPA has identified 65 pollutants and classes of pollutants as toxic, among which 126 specific substances have been designated by EPA as priority toxic pollutants.[7] All other pollutants are considered nonconventional.

Table 2-1. Statutorily Prescribed Levels of Control

Level of Control	CWA Statutory Reference	Description
Best Practicable Control Technology (BPT)	CWA sections 301(b)(1)(A) and 304(b)(1), 33 U.S.C. 1311(b)(1)(A) and 1314(b)(1)	EPA develops effluent limitations based on BPT for conventional, toxic, and nonconventional pollutants. EPA establishes BPT effluent limitations based on the average of the best performance of facilities within an industry of various ages, sizes, processes, or other common characteristics. Where existing performance is uniformly inadequate, BPT may reflect higher levels of control than currently in place in an industrial category if the agency determines that the technology can be practically applied.
Best Conventional Pollutant Control Technology (BCT)	CWA sections 301(b)(2)(E) and 304(b)(4), 33 U.S.C. 1311(b)(2)(E) and 1314(b)(4)	BCT addresses conventional pollutants from existing industrial point sources. EPA establishes BCT limitations by considering the factors specified in Section 304(b)(4)(B), including a two-part "cost-reasonableness" test. This methodology was published in a Federal Register notice on July 9, 1986 (51 FR 24974).
Best Available Technology Economically Achievable (BAT)	CWA sections 301(b)(2)(A) and 304(b)(2), 33 U.S.C. 1311(b)(2)(A) and 1314(b)(2)	EPA develops effluent limitations based on BAT for toxic and nonconventional pollutants. BAT represents the best available economically achievable performance of plants in an industrial subcategory or category. Factors considered in establishing BAT include the age of equipment and facilities involved, the process employed, the engineering aspects of control techniques or process changes, the cost of achieving such effluent reduction, non-water quality environmental impacts (including energy requirements), and such other factors as the Administrator deems appropriate. (33 U.S.C. 1314(b)(2)(B)). BAT limitations may be based on end-of-pipe wastewater treatment or effluent reductions attainable through changes in a facility's processes and operations.
Standards of Performance for New Sources (NSPS)	CWA section 306, 33 U.S.C. 1316	EPA develops effluent limitations based on NSPS for conventional, toxic, and nonconventional pollutants. NSPS reflect effluent reductions based on the best available demonstrated control technology. (33 U.S.C. 1316(a)(1)). In establishing or revising NSPS, EPA considers the cost of achieving such effluent reduction and any non-water-quality, environmental impact, and energy requirements. (33 U.S.C. 1316(b)(1)(B)).

[5] See https://www.epa.gov/eg/learn-about-effluent-guidelines.

[6] 44 FR 44501

[7] Appendix A to Part 423, reprinted after 40 CFR Part 423.17

Table 2-1. Statutorily Prescribed Levels of Control

Level of Control	CWA Statutory Reference	Description
Pretreatment Standards for Existing Sources (PSES)	CWA section 307(b), 33 U.S.C. 1317(b)	EPA develops PSES for nonconventional and toxic pollutants. PSES are national, uniform, technology-based standards that apply to indirect dischargers. They are designed to prevent the discharge of pollutants that pass through, interfere with, or are otherwise incompatible with the operation of POTWs. (33 U.S.C. 1317(b)(1)) The agency considers the same factors for PSES as it does for BAT limitations. (33 U.S.C. 1314(b)(2)(B))
Pretreatment Standards for New Sources (PSNS)	CWA section 307(c), 33 U.S.C. 1317(c)	EPA develops PSNS for nonconventional and toxic pollutants. PSNS are national, uniform, technology-based standards that apply to new indirect dischargers. Like PSES, they are designed to prevent the discharges of pollutants that pass through, interfere with, or are otherwise incompatible with the operation of POTWs. PSNS are issued at the same time as NSPS. (33 U.S.C. 1317(c)). The agency considers the same factors in promulgating PSNS as it considers in promulgating NSPS. (33 U.S.C. 1316(a)(1))

EPA and states implement ELGs for point sources that discharge pollutants into surface waters through National Pollutant Discharge Elimination System (NPDES) permits.[8] POTWs, states, and EPA enforce pretreatment standards for point sources that discharge to POTWs.[9]

2.3 Effluent Guidelines Review and Planning Process

The CWA contains multiple provisions requiring EPA to review and revise the limitations, standards, and guidelines that apply to new and existing as well as direct and indirect dischargers.

For existing direct dischargers, i.e., those who discharge into navigable waters, the CWA requires EPA to review effluent limitations "at least every five years and, if appropriate, revise[]" those limitations.[10] The CWA also requires EPA to publish regulations providing "guidelines for effluent limitations, and, at least annually thereafter, revise, if appropriate, such regulations."[11] Historically, rather than conducting separate reviews, EPA consolidates its review of effluent limitations required under section 301(d) into its review of ELGs under section 304(b).[12]

For indirect dischargers, i.e., those who discharge to POTWs, the CWA requires EPA "from time to time" to publish proposed regulations establishing pretreatment standards.[13] The CWA also requires EPA to "review at least annually . . . and, if appropriate, revise guidelines for pretreatment."[14]

For new sources, both direct and indirect, the CWA requires EPA to "publish (and from time to time thereafter [] revise) a list of categories of sources, which shall, at the minimum, include . . ." and "propose and publish regulations establishing Federal standards of performance for new sources within

[8] See CWA sections 301(a), 301(b), and 402; 33 U.S.C. 1311(a), 1311(b), and 1342.
[9] See CWA sections 307(b) and 307(c); 33 U.S.C. 1317(b) and 1317(c).
[10] See CWA section 301(d); 33 U.S.C. 1311(d).
[11] See CWA section 304(b); 33 U.S.C. 1314(b). S*ee also Our Children's Earth v. EPA*, 527 F.3d 842, 848-49 (9th Cir. 2008) ("Sections 304(b) and (m) require an annual review of "guidelines for effluent limitations" applicable to direct dischargers and revision "if appropriate.").
[12] *See Our Children's Earth v. EPA*, 527 F.3d 842, 849 (9th Cir. 2008) (discussing EPA's processes of combining the reviews required under sections 301(d) and 304(b)).
[13] See CWA section 307(b); 33 U.S.C. 1317(b).
[14] See CWA section 304(g); 33 U.S.C. 1314(g).

such category . . ."[15] The CWA further provides that, "[t]he Administrator shall, from time to time, as technology and alternatives change, revise such standards following the procedure required by this subsection for promulgation of such standards."[16]

In the 1987 Amendments to the CWA, Congress added a provision that requires EPA to biennially publish in the Federal Register a "plan" that "establish[es] a schedule for the annual review and revision of promulgated effluent guidelines"; identifies certain categories of sources for which ELGs have not previously been published and establishes a schedule for promulgating ELGs for certain categories of sources for which such guidelines have not previously been published.[17] The biennial planning requirement was enacted after the CWA provisions regarding review and revision of effluent limitations and ELGs and informs EPA's obligations under those provisions. When read together, these provisions require EPA to annually review ELGs and revise those guidelines, if appropriate; and to biennially publish a plan as described above.

While the CWA requires EPA to annually "review" effluent limitations guidelines and pretreatment guidelines,[18] it does not require EPA to make a "yes" or "no" determination every year on whether to revise the guidelines. See Effluent Guidelines Program Plan 14 (Plan 14, U.S. EPA, 2021a), Section 2.3 for further discussion of EPA's annual obligations.

To increase transparency and stakeholder awareness, EPA's biennial plans include information on its review of existing ELGs and pretreatment standards, as well as industries reviewed for potential development of new ELGs or pretreatment standards.

Preliminary Plan 15 describes ongoing planning activities, including projects EPA initiated as part of its 2020 annual review, and describes EPA's effluent guidelines planning efforts, including preliminary category reviews, category studies, and ELG rulemakings. For additional details, see EPA's *Review of Industrial Wastewater Discharge Monitoring Report (DMR) Data for Preliminary Plan 15* and *2020 Preliminary Review of Industrial Point Source Categories* (U.S. EPA, 2021b, 2021c).

[15] See CWA section 306(b)(1); 33 U.S.C. 1316(b)(1).
[16] See CWA section 306(b)(1)(B); 33 U.S.C. 1316(b)(1)(B).
[17] See CWA section 304(m); 33 U.S.C. 1314(m).
[18] See CWA sections 304(b), 304(m)(1)(A), and 304(g); 33 U.S.C. 1314(b), 1314(m)(1)(A), 1314(g).

3. Solicitation of Public Comments

EPA seeks public input and comment on all aspects of its planning process including the entirety of Preliminary Plan 15. In particular, EPA requests comments on the following questions and related themes:

- EPA solicits feedback on the cross-category rankings analysis. To the extent that any comment advocates for a revision to existing ELGs the commenter should explain why EPA should prioritize these point source categories ahead of the ones that EPA is studying and revising (Section 5.1).
- EPA solicits public input on the capabilities, performance, and costs of membrane treatment technologies for industrial wastewater to support the membrane technology review (Section 5.8).
- EPA solicits public input on how best to incorporate environmental justice into the ELG planning process (Section 5.10).
- EPA solicits feedback on the findings of the Preliminary Multi-Industry PFAS study, specifically findings from the pulp and paper manufacturers and commercial airports (Section 6.4, U.S. EPA, 2021d).
- EPA solicits public input on the announcements made within Preliminary Plan 15 regarding ongoing studies and rulemaking activities (Sections 6 and 7).

4. SUMMARY OF ANNUAL REVIEW ACTIVITIES

Preliminary Plan 15 presents EPA's 2020 annual review activities, including its expanded cross-category review of discharge monitoring report (DMR) monthly average concentration data, initiated as part of the 2019 annual review and discussed in Plan 14 (U.S. EPA, 2021a). EPA updated the analysis using 2019 DMR data and analyzed the results using two different ranking approaches to identify categories that have discharges with relatively high pollutant concentrations compared to other point source categories (PSCs) (see Section 5.1). This analysis looked across all existing ELGs, including relevant data for industries with existing ELGs, and data for some industries that are not currently regulated by ELGs. Based on the results of the rankings analysis, EPA identified seven PSCs for preliminary review to assess which categories, if any, require further review and study (see Sections 5.2 through 5.6). EPA also conducted a preliminary review of the Landfills PSC (40 CFR Part 445) to assess the discharges of perfluorinated compounds, based on ongoing industrial wastewater reviews and stakeholder input (see Section 5.7, U.S. EPA, 2021a and 2021d). In addition, EPA continued to develop and update tools to facilitate the annual review and biennial planning processes, including a review of treatment technologies (see Section 5.8), and the Industrial Wastewater Treatment Technology (IWTT) and Effluent Limitations Guidelines (ELG) Databases (see Section 5.9).

The 2020 annual review and the information presented in this Preliminary Plan 15 build on EPA's previous annual reviews, including the 2019 annual review and ELG planning process described in Plan 14 (U.S. EPA, 2021a). Likewise, the analyses presented herein, as well as public comments received on Preliminary Plan 15, will inform EPA's 2021 annual review and ELG planning process. EPA welcomes comments on including the following analyses in the 2021 annual review:

- Evaluation of industrial category rankings based on annual pollutant loadings rather than concentration.
- Conduct of the cross-category concentration rankings analysis for a targeted pollutant group, such as toxic pollutants, rather than aggregating all pollutants.
- Updates to and expansion of the impaired waters analysis described in Plan 14, using new Assessment, Total Maximum Daily Load Tracking and Implementation System (ATTAINS) data.
- Reviews of emerging contaminants.

EPA plans to describe its 2021 annual review and consider any public comments received on Preliminary Plan 15 in developing Effluent Guidelines Program Plan 15.

5. REVIEWS OF INDUSTRIAL WASTEWATER DISCHARGES AND TREATMENT TECHNOLOGIES

This section describes EPA's ongoing ELG program planning activities and analyses to identify industrial categories for potential new or revised ELGs and summarizes the data sources used to complete the reviews and the limitations of those data. This section also presents findings and next steps for the associated planning activities. Since Plan 14 (U.S. EPA, 2021a), EPA has undertaken the following efforts (discussed further below):

- Continued a cross-category review of monthly average concentration data from discharge monitoring reports (DMR) (see Section 5.1).
- Conducted preliminary category reviews of the top-ranking point source categories (PSCs) identified in the cross-category review of DMR concentration data and other categories identified through stakeholder input (see Sections 5.2 through 5.7).
- Continued to screen, prioritize, and further review specific industrial wastewater treatment technologies that may be more broadly evaluated as technology options in future studies and rulemakings (see Section 5.8).
- Continued to compile wastewater treatment technology information in the Industrial Wastewater Treatment Technology (IWTT) Database and populate the information in the IWTT web application for public use (see Section 5.9.1).
- Published the ELG Database, which includes information across all regulated PSCs in a consolidated, searchable database (see Section 5.9.2).

In Plan 14, EPA discussed the possibility of initiating reviews of four industrial categories based on EPA's 2019 nutrient analyses. EPA's 2020 analysis of the overall amount of nutrient discharges indicated that further review of one category— Explosives Manufacturing (40 CFR Part 457)— is appropriate. EPA's analysis did not, however, support further review of Fertilizer Manufacturing (40 CFR Part 418), Plastics Molding and Forming (40 CFR Part 463), or Miscellaneous Food and Beverages (no current ELG) at this time. As discussed below, these latter three categories did not rank highly in EPA's 2020 analyses of pollutant discharges as compared to the other categories and other current EPA priorities for rulemaking. EPA uses its annual analyses and technical expertise to prioritize its reviews and to focus on point source categories that are best suited for revisions that further the objectives of the CWA. EPA solicits comments on using this 2020 analysis as a basis for prioritization. EPA may choose to continue its reviews of these categories in the future.

As required by the CWA, EPA reviewed all PSCs as part of its annual review. For categories not discussed in detail in this Preliminary Plan 15, EPA is currently not prioritizing further review. As described in detail below and in documents in the docket for this preliminary plan, EPA does not have data indicating that these categories discharge quantities of pollutants that would warrant revising the ELGs at this time. Additionally, given EPA's available resources, these categories are less important than the other PSC for which EPA is undertaking further study and or rulemaking. EPA solicits comment on this approach and will continue to review all categories while preparing the next plan.

EPA received petitions[19,20] for rulemaking that request changes to the ELGs for Concentrated Animal Feeding Operations and Plastic Manufacturers and EPA is carefully reviewing those petitions. At this time, based on EPA's general methodology and results from the 2020 annual review, and balancing this information with the agency's available resources for ELG revisions and this Administration's priorities, EPA is not planning to revise these ELGs at this time. EPA solicits comments on this approach and to the extent that any comment advocates for a revision to the ELGs, the commenter should explain why EPA should prioritize these point source categories ahead of the ones that EPA is studying and revising.

5.1 Cross-Category Review of Discharge Monitoring Report Concentration Data

As part of its 2020 annual review of the ELGs, EPA evaluated concentration data reported by industrial facilities on their 2019 DMRs. This analysis, referred to as the cross-category concentration rankings analysis, compared facility wastewater discharge pollutant concentrations across PSCs to identify categories that have relatively high pollutant concentration discharges compared to other PSCs. This comparison provides a mechanism for prioritizing specific PSCs for further review and adds to the analysis begun as part of EPA's 2019 annual review (U.S. EPA, 2021a). The following subsections discuss the data sources and methodology of the cross-category review, describe some factors that EPA considered in its review, summarize the results, and present potential refinements that EPA is considering to improve the analysis. For additional details on the cross-category concentration analysis, see *EPA's Review of Industrial Wastewater Discharge Monitoring Report (DMR) Data for Preliminary Plan 15* (2020 DMR Data Report, U.S. EPA, 2021b).

5.1.1 Data Used in the Analysis

For this analysis, EPA evaluated available industrial wastewater discharge data reported on facilities' 2019 DMRs. Facilities that directly discharge wastewater to surface waters of the United States pursuant to a National Pollutant Discharge Elimination System (NPDES) permit are required to report monitoring data via DMRs for pollutants listed in their NPDES permits. Facilities send DMRs electronically to their respective NPDES permitting authorities (state or EPA). The DMR data are stored in EPA's centralized program database, Integrated Compliance Information System National Pollutant Discharge Elimination System (ICIS-NPDES). ICIS-NPDES captures pollutant-specific permit limits, monitoring requirements, and DMR data, including, but not limited to facility, outfall, and monitoring-period-specific pollutant discharge concentrations, quantities, and wastewater flows. EPA used the following three sets of 2019 DMR data from ICIS-NPDES to rank PSCs by the concentrations of pollutants in their discharges relative to other PSCs:

- *2019 DMR Industrial Monthly Average Concentration Data*
- *2019 DMR Industrial Monthly Average Quantity Data*
- *2019 DMR Flow Data*

[19] Food & Water Watch, et al. "Petition to Revise the Clean Water Act Regulations for Concentrated Animal Feeding Operations." Submitted 8 March, 2017.

[20] Center for Biological Diversity, et al. "Petition to Revise the Clean Water Act Effluent Limitations Guidelines and Standards for the Petro-Plastics Industry Under the 40 C.F.R. Part 419 Petroleum Refining Industrial Category (Cracking and Petrochemicals Subparts) and Part 414 Organic Chemicals, Plastics, and Synthetic Fibers Industrial Category." Submitted 23 July, 2019.

EPA used 2019 data for this review because they comprised the most recent and complete set of industrial wastewater discharge data available when this review began.

5.1.2 Methodology and Considerations for the Analyses

EPA limited the cross-category concentration analysis to toxic and nonconventional pollutants to focus the analysis on pollutants that have historically been part of the rationale to revise ELGs.

Facilities may monitor and report concentration and quantity data for different statistical bases (i.e., averages, maximums, or minimums) and frequencies (e.g., annually, monthly, or daily) depending on their NPDES permit requirements. To maintain comparability between data reported by facilities and to account for variability of the data throughout the year, EPA used concentration and quantity data reported as monthly averages in this analysis.

To prepare the data for analysis, when reported concentration data were not available, EPA calculated discharge concentrations of pollutants from quantity and flow data and then combined into a static database these calculated monthly average concentration data with the reported monthly average concentrations for all facilities and all monitoring periods into a static database (ERG, 2021). If a facility reported both a concentration and a quantity for the same monitoring period, parameter, and outfall, EPA prioritized the reported concentration over the calculated concentration derived from the quantity value to avoid double counting data. EPA then averaged all the monthly average concentrations from 2019 (either reported or calculated when a reported value was not available) to calculate a single 2019 average monthly concentration for each pollutant reported for each facility that could be compared with other facilities for use in the cross-category concentration analysis.

EPA used established crosswalks maintained in the Loading Tool documentation to relate individual facility and reported pollutants to the most appropriate PSC, commonly based on the facility's primary reported Standard Industrial Classification (SIC) or North American Industry Classification System (NAICS) code.[21]

Once the data were processed, as described above, EPA followed the steps described below to compare wastewater discharge pollutant concentrations across pollutants for facilities in each PSC to identify categories that have relatively high pollutant concentration discharges.

Step 1: Calculate Median Pollutant Concentrations by PSC

From the concentration data set, EPA calculated the median of the average monthly concentrations (hereafter referred to as the median concentration) for each pollutant discharged by facilities in each PSC. If a pollutant was only reported by one facility within a PSC, EPA excluded that pollutant from this analysis because it was considered unrepresentative of category discharges.

Step 2: Identify PSCs with Highest Median Concentrations by Pollutant

For each pollutant, EPA sorted the median pollutant concentrations for the PSCs from highest to lowest, assigning each PSC a rank. EPA only ranked PSCs with median concentrations greater than 0 mg/L in order to focus its review on top-ranking discharges. EPA removed pollutants

[21] EPA did not review facilities that did not report a SIC or NAICS code, facilities that reported a SIC code of 4952 (publicly and privately owned treatment works), and facilities that reported a SIC code but are not industrial facilities.

reported by only one PSC because the analysis is intended to be a comparison of discharge concentrations across PSCs.

Step 3: Calculate PSC Scores

EPA used two approaches[22] to count the number of top-ranking pollutants within a PSC and developed a PSC score for each approach:

- *Top Five PSC Approach*. Counts the number of pollutants where the median concentration for the PSC was among the five highest median concentrations for the pollutant across all PSCs.
- *Top 25 Percent PSC Approach*. Counts the number of pollutants where the median concentration for the PSC was among the top 25 percent of highest median concentrations for the pollutant across all PSCs.

To normalize for the varying number of pollutants reported by each PSC, EPA divided the count of top-ranking pollutants (under each approach) by the total number of pollutants reported by more than one facility in the PSC. This provided a directly comparable "score" for each PSC representing the percent of pollutants in the PSC with median concentrations ranked higher across PSCs. Using the Sugar Processing category as an example, the median pollutant concentrations ranked among the top five across PSCs for seven of the 12 pollutants (58 percent) reported by the facilities in the PSC and among the top 25 percent for eight of the 12 pollutants (67 percent), see Table 5-1. These percentages become the PSC's scores for the *Top Five PSC Approach* and *Top 25 Percent PSC Approach*, respectively.

Step 4: Rank and Prioritize PSCs for Further Review

EPA ranked the categories by the PSC score using both the *Top Five PSC Approach* and the *Top 25 Percent PSC Approach* (identified in Step 3). EPA selected the top-five ranking PSCs from each approach for further consideration for preliminary category review, excluding any PSCs currently being reviewed (as identified in Plan 14, U.S. EPA, 2021a). See Section 5.1.3 for the specific PSCs selected for the 2020 annual review.

EPA identified several limitations of the cross-category concentration analysis, which include but are not limited to the following:

- Analysis is relative to what other categories are reporting and does not consider the extent of discharge. A PSC that discharges larger concentrations relative to other categories may or may not indicate the potential for reducing or eliminating pollutant discharges within that PSC.
- Analysis uses median concentration and does not directly account for the range of concentration data within a PSC.
- Analysis does not compare the median pollutant concentrations for a PSC to any national effluent limitations, if there is one, or to specific permit limits.
- Analysis does not consider the magnitude (i.e., pollutant loading) or toxicity of the pollutants being discharged.

[22] EPA analyzed the rankings using two different approaches to account for top-ranking PSCs that are identified using the *Top Five PSC Approach* simply because few PSCs report a pollutant. This can result in PSCs being flagged as having a median concentration ranking in the top five, even if there are less than five PSCs reporting a pollutant.

- Analysis may rank higher those PSCs whose facilities monitor and report pollutants unique to the PSC simply because few other PSCs report those pollutants.

Even with these limitations, the cross-category concentration analysis provides an appropriate screening-level review of industrial discharges, as it allows comparison of the concentrations of pollutant discharges between PSCs.

5.1.3 Results of the Cross-Category Concentration Analysis

Table 5-1 presents the results of this analysis, including the following information for each PSC:

- *Top Five Approach PSC Score*. Percent of pollutants reported by more than one facility where the PSC's median concentration ranked among the five highest median concentrations reported for the pollutant across all PSCs. Value is calculated from the number of pollutants that rank in the top five and the number of pollutants with data reported. The table is sorted from highest to lowest PSC score (and then alphabetically for PSCs with the same score).
- *Top Five Approach Number of Top-Ranking Pollutants*. Number of pollutants reported by more than one facility where the PSC's median concentration ranked among the five highest median concentrations reported for the pollutant across all PSCs.
- *Top 25 Percent Approach PSC Score*. Percent of pollutants reported by more than one facility where the PSC's median concentration ranked among the 25 percent highest median concentrations reported for the pollutant across all PSCs. Value is calculated from the number of pollutants that rank in the top 25 percent and the number of pollutants with data reported.
- *Top 25 Percent Approach Number of Top-Ranking Pollutants*. Number of pollutants reported by more than one facility where the PSC's median concentration ranked among the top 25 percent highest median concentrations reported for the pollutant across all PSCs.
- *Number of Pollutants with Data Reported*. Number of pollutants considered as part of the cross-category concentration analysis that were reported by more than one facility within a PSC. Pollutants excluded from this analysis (e.g., conventional pollutants or those reported by only one facility) are not captured in the counts for this analysis.
- *Number of Facilities Reporting Data*. Number of facilities corresponding to reported concentrations for pollutants considered part of the cross-category concentration analysis. Facilities reporting conventional pollutants, or other excluded pollutants, are not captured in the counts for this analysis.

EPA selected for further review the PSCs that were among the top five PSC scores from either of the two "top-five" approaches described above, after excluding any categories currently under review (U.S. EPA, 2021a). The following PSCs ranked in the top five in one or both of the two approaches (also highlighted in green and blue in Table 5-1):

- Metal Products and Machinery (40 CFR Part 438)
- Battery Manufacturing (40 CFR Part 461)
- Explosives Manufacturing (40 CFR Part 457)
- Canned and Preserved Seafood Processing (40 CFR Part 408)
- Paint Formulating (40 CFR Part 446)
- Sugar Processing (40 CFR Part 409)

- Soap and Detergent Manufacturing (40 CFR Part 417)

As a first step, for each of the seven categories listed above, EPA reviewed the underlying 2019 DMR concentration data for the top-ranking pollutants and the facilities reporting the top-ranking concentration data. Following this initial review, EPA decided to exclude the following two PSCs from further preliminary review:

- **Paint Formulating (40 CFR Part 446).** This PSC ranked high for total residual chlorine, chlorine product oxidants, and iron. The direct discharge requirements for existing and new plants state "there shall be no discharge of wastewater pollutants to navigable waters" (40 CFR Part 446). These pollutants were reported by five facilities and, through a review of the facility NPDES permits, EPA determined that these pollutants are associated with the discharges of noncontact cooling water and stormwater. The permit requirements are all based on state water quality criteria. Based on the available data, and the limited number of facilities reporting these discharges, revisions to the ELGs are unlikely to result in significant pollutant discharge reductions relative to the other point source categories discussed in this Plan.
- **Battery Manufacturing (40 CFR Part 461).** This PSC ranked high for lead, which were only reported by two out of 21 facilities. Based on EPA's review of the 2019 DMR concentration data, both facilities manufacture storage batteries and are captured under Subpart C of the Battery Manufacturing ELGs (Lead Subcategory). Permit requirements for both facilities are based on state water quality criteria and the ELGs. One facility is currently reporting concentrations that exceed permit limits. Based on the available data, and the number of facilities reporting these discharges, revisions to the ELGs are unlikely to result in significant pollutant discharge reductions relative to the other point source categories discussed in this Plan. EPA recommends that state and local permitting authorities consider applying water-quality based effluent limits or best professional judgement on a case-by-case basis, as appropriate, to address any other potential issues with pollutants in discharges from this category.

Table 5-1. Cross-Category Concentration Analysis Results

PSC	PSC Name	Top Five Approach: PSC Score (Percent of Top- Ranking Pollutants)	Top Five Approach: Number of Top-Ranking Pollutants	Top 25 Percent Approach: PSC Score (Percent of Top-Ranking Pollutants)	Top 25 Percent Approach: Number of Top- Ranking Pollutants	Number of Pollutants with Data Reported	Number of Facilities Reporting Data
469	Electrical and Electronic Components[a]	100.0%	3	100.0%	3	3	5
461	Battery Manufacturing	100.0%	1	100.0%	1	1	2
438	Metal Products and Machinery	100.0%	11	0.0%	0	11	63
457	Explosives Manufacturing	80.0%	4	80.0%	4	5	6
408	Canned and Preserved Seafood Processing	66.7%	6	77.8%	7	9	27
417	Soap and Detergent Manufacturing	63.3%	19	20.0%	6	30	11
429	Timber Products Processing	60.5%	23	28.9%	11	38	54
409	Sugar Processing	58.3%	7	66.7%	8	12	15
455	Pesticide Chemicals	55.6%	5	55.6%	5	9	15
414	Organic Chemicals, Plastics and Synthetic Fibers[a]	51.6%	32	24.2%	15	62	296
446	Paint Formulating	50.0%	2	75.0%	3	4	6
443	Paving And Roofing Materials (Tars and Asphalt)	50.0%	8	50.0%	8	16	37
437	Centralized Waste Treatment[a]	50.0%	14	32.1%	9	28	7
420	Iron and Steel Manufacturing	44.7%	21	38.3%	18	47	100
432	Meat and Poultry Products[a]	43.3%	13	40.0%	12	30	185
415	Inorganic Chemicals Manufacturing	40.5%	17	38.1%	16	42	112
N/A	Food Service Establishments	40.0%	2	40.0%	2	5	107
467	Aluminum Forming	40.0%	4	40.0%	4	10	10
433	Metal Finishing	40.0%	18	26.7%	12	45	357
439	Pharmaceutical Manufacturing	37.5%	9	37.5%	9	24	32
430	Pulp, Paper and Paperboard	37.1%	13	40.0%	14	35	145
421	Nonferrous Metals Manufacturing	37.0%	10	40.7%	11	27	36
426	Glass Manufacturing	36.8%	7	42.1%	8	19	23
442	Transportation Equipment Cleaning	36.4%	8	18.2%	4	22	39

Table 5-1. Cross-Category Concentration Analysis Results

PSC	PSC Name	Top Five Approach		Top 25 Percent Approach		Number of Pollutants with Data Reported	Number of Facilities Reporting Data
		PSC Score (Percent of Top- Ranking Pollutants)	Number of Top-Ranking Pollutants	PSC Score (Percent of Top-Ranking Pollutants)	Number of Top- Ranking Pollutants		
423	Steam Electric Power Generating[a]	36.0%	18	10.0%	5	50	442
445	Landfills	34.1%	14	19.5%	8	41	143
N/A	Independent And Stand Alone Labs	33.3%	4	25.0%	3	12	14
435	Oil & Gas Extraction[a]	33.3%	9	29.6%	8	27	76
449	Airport Deicing	31.3%	5	37.5%	6	16	44
436	Mineral Mining and Processing	31.3%	10	18.8%	6	32	217
471	Nonferrous Metals Forming and Metal Powders	30.4%	7	56.5%	13	23	33
405	Dairy Products Processing	30.0%	6	30.0%	6	20	77
418	Fertilizer Manufacturing	27.8%	5	33.3%	6	18	35
N/A	Drinking Water Treatment	27.8%	10	22.2%	8	36	1425
N/A	Unassigned Waste Facility	27.5%	11	17.5%	7	40	115
460	Hospital	26.7%	4	33.3%	5	15	140
468	Copper Forming	25.0%	1	50.0%	2	4	5
424	Ferroalloy Manufacturing	23.8%	5	23.8%	5	21	9
440	Ore Mining and Dressing	23.3%	7	10.0%	3	30	72
419	Petroleum Refining	21.9%	7	15.6%	5	32	331
434	Coal Mining	20.5%	8	10.3%	4	39	1700
464	Metal Molding and Casting (Foundries)	20.0%	3	40.0%	6	15	29
450	Construction and Development	20.0%	4	25.0%	5	20	49
412	Concentrated Animal Feed Operations	20.0%	1	40.0%	2	5	16
407	Canned And Preserved Fruits and Vegetables Processing	18.8%	3	25.0%	4	16	56
444	Waste Combustors	13.3%	2	33.3%	5	15	11
463	Plastics Molding and Forming	12.5%	2	31.3%	5	16	31
451	Concentrated Aquatic Animal Production	12.5%	2	0.0%	0	16	193
428	Rubber Manufacturing	11.8%	2	11.8%	2	17	43

Table 5-1. Cross-Category Concentration Analysis Results

PSC	PSC Name	Top Five Approach		Top 25 Percent Approach		Number of Pollutants with Data Reported	Number of Facilities Reporting Data
		PSC Score (Percent of Top- Ranking Pollutants)	Number of Top-Ranking Pollutants	PSC Score (Percent of Top-Ranking Pollutants)	Number of Top- Ranking Pollutants		
N/A	Miscellaneous Foods and Beverages	10.7%	3	0.0%	0	28	82
406	Grain Mills	9.1%	1	63.6%	7	11	26
410	Textile Mills[a]	8.3%	1	50.0%	6	12	31
411	Cement Manufacturing	4.3%	1	4.3%	1	23	48
N/A	Printing & Publishing	0.0%	0	0.0%	0	1	2
422	Phosphate Manufacturing	0.0%	0	12.5%	1	8	14

Source: U.S. EPA, 2021b.
N/A: Not Applicable
[a] EPA is conducting other efforts on these categories and they were not further reviewed in this context.
Note: Top PSCs identified through the Top Five Approach are highlighted in blue, and top PSCs identified through the Top 25 Percent Approach are highlighted in green. PSCs not included in this review due to only one facility reporting a pollutant: Coil Coating, Gum and Wood Chemicals Manufacturing, Industrial Laundries, Leather Tanning and Finishing, Tobacco Products, Carbon Black Manufacturing, Ink Formulating, Asbestos Manufacturing

EPA's preliminary reviews of the remaining five PSCs are summarized in Sections 5.2 through 5.6. EPA's preliminary review of the Landfills Category, identified for review through stakeholder input, is summarized in Section 5.7.

To conduct the preliminary category reviews, EPA reviewed available rulemaking documentation, publicly available NPDES discharge permits and fact sheets, other publicly available facility discharge information in the Loading Tool (e.g., Toxics Release Inventory (TRI) data), contacted relevant EPA Regions and state permitting authorities, and compared available discharge concentrations to ELGs, long-term averages, and available effluent data from EPA's IWTT database (see Section 5.9.1), ELG database (see Section 5.9.2), or other benchmarks. EPA analyzed these concentration data to compare current performance to the potential for improvements based on upgraded treatment technologies. See EPA's *2020 Preliminary Review of Industrial Point Source Categories* (2020 Preliminary Category Review Report) for more details on EPA's preliminary category reviews (U.S. EPA, 2021c).

5.1.4 Potential Refinements to the Analysis

EPA considers the cross-category concentration analysis to be a dynamic screening level analysis that can be adapted in future annual reviews and ELG planning cycles to further refine EPA's prioritization of PSCs for review. EPA plans to make the following refinements in future reviews to expand the scope of the current analysis:

- *Update DMR data*. Industrial facilities submit new DMRs continuously, based on permit and reporting requirements. EPA may refresh the cross-category concentration analysis with updated DMR data to review the current state of discharges within and across PSCs. This will capture changes based on updated permitting requirements such as the incorporation of emerging pollutants that are added to permits to address water quality criteria and standards. Additionally, refreshing the analysis with updated DMR data would enable reviews more closely reflecting the current state of industrial practice, including recent changes in market conditions or manufacturing processes that may have led to fluctuations in discharges.
- *Evaluate pollutant loads.* The current cross-category concentration analysis uses concentration data submitted through DMRs. EPA may perform the cross-category analysis using pollutant loads (pounds of pollutants discharged per year) instead of, or in addition to, concentrations to capture the magnitude of the discharge and account for the impacts of facility and industry flow.
- *Include TRI data.* If conducting an analysis of pollutant loads, EPA may also consider incorporating TRI data to assess discharges of additional toxic pollutants not reported on DMRs, as well as indirect discharges. The TRI program only requires reporting of pollutant loads; it does not provide data on pollutant concentrations or facility flows.
- *Focus analysis on specific group(s) of pollutants*. EPA may perform the cross-category concentration analysis for a specific group of pollutants (e.g., metals, organics, toxics), depending on agency priorities or the availability of a viable technology to treat specific pollutants or pollutant groups.

5.2 Metal Products and Machinery (40 CFR Part 438)

EPA reviewed the Metal Products and Machinery (MP&M) Category because it ranked high in the 2020 cross-category concentration analysis for 11 pollutants, all of which were defined as toxic organics in the 2003 MP&M Technical Development Document (U.S. EPA, 2021c). The 11 top-ranking pollutants were:

- 1,4-Dioxane
- Acenaphthene
- Anthracene
- Chloroform
- Fluoranthene
- Fluorene
- Methylene chloride
- Naphthalene
- Phenanthrene
- Pyrene
- Trichloroethylene

EPA promulgated BPT, BCT, and NSPS limitations for the MP&M Category in 2003, specifically for the Oily Wastes Subcategory. The limitations included total suspended solids (TSS), oil and grease (O&G), and pH and were based on the following technologies: chemical emulsion followed by gravity separation using an oil/water separator, two-stage countercurrent cascade rinsing for all flowing rinses, centrifugation and recycling of painting water curtains, and centrifugation, pasteurization, and recycling of water-soluble machining coolants. There are no pretreatment standards for the MP&M Category.

EPA reviewed the 2019 DMR concentration data for both regulated pollutants and top-ranking pollutants. EPA compared the TSS and O&G 2019 DMR concentration data for the MP&M Category to available effluent data in IWTT for different treatment technologies. EPA found that current discharge concentrations of both TSS and O&G from MP&M facilities are within the range of the effluent concentrations in IWTT and the long-term averages (LTAs) documented during the MP&M rulemaking.

EPA compared the top-ranking pollutants to available effluent concentration data in IWTT and to other benchmarks, including EPA and state water quality criteria (both human health and aquatic). The rulemaking documents indicate that O&G was identified as a surrogate pollutant for the 11 top-ranking pollutants identified in EPA's rankings analysis and that they would be controlled through the regulation of O&G. Based on these data, the current toxic organic pollutant and O&G discharge concentrations are consistent with discharges from treatment technologies evaluated in IWTT. EPA is not considering revision of the ELGs for this category at this time because, based on the available data, such a revision is unlikely to yield significant pollutant discharge reductions.

5.3 Explosives Manufacturing (40 CFR Part 457)

EPA identified the Explosives Manufacturing (Explosives) Category for preliminary review because it ranked high in the 2020 cross-category concentration analysis for nitrogen, ammonia, and phosphorus (U.S. EPA, 2021c).

EPA promulgated BPT limitations for two subcategories, Subpart A (Manufacture of Explosives) and Subpart C (Explosives Load, Assemble, and Pack Plants) in 1976. Subpart A limitations include biological oxygen demand (BOD_5), chemical oxygen demand (COD), and TSS. The technology basis for these limitations includes equalization, neutralization, primary sedimentation (or pre-clarification), activated sludge (aeration basin, final clarification), and sludge handling system. For Subpart C, the limitations include TSS and O&G and are based on the Subpart A technology followed by extended aeration, which includes screening, biotreatment, and clarification with skimming and chlorination.

EPA compared the 2019 DMR concentration data for the regulated pollutants to available effluent data in IWTT for different treatment technologies and effluent data collected during the 1976 rulemaking. EPA found that current discharge concentrations of regulated pollutants from these facilities are within the range of the effluent concentrations in IWTT and the rulemaking data.

For the top-ranking pollutants, EPA evaluated each of the six facilities reporting the nutrient parameters. EPA found that the some of these facilities were making updates to their facility operations, treatment systems, and outfalls to comply with the revised limits and legal agreements with corresponding permitting authorities, some were out of compliance with permit limits, and the remainder were within

the ranges of concentrations evaluated from IWTT and the rulemaking data. For this reason, EPA did not select this category for further review.

5.4 Canned and Preserved Seafood (40 CFR Part 408)

EPA identified the Canned & Preserved Seafood Processing (Seafood Processing) Category for preliminary review because it ranked high in the 2020 cross-category concentration analysis for nutrients, zinc, and mercury (U.S. EPA, 2021c).

The Seafood Processing Category, promulgated in 1974 and 1975, is organized into 33 subcategories, generally characterized by the processing type and the species processed. EPA established production-based BAT limitations for BOD_5, TSS, O&G, and pH for 30 subcategories based on a technology option include screening systems, dissolved air flotation units, grease traps, and process modifications to reduce wastewater loads. The remaining three subcategories are considered to be remote Alaskan seafood processors, and are required to grind solids down to 0.5 inches or less in any direction.

In 1980, EPA received a petition requesting a suspension of the applicability requirements for onshore seafood processors in the Alaskan cities of Anchorage, Cordova, Juneau, Ketchikan, and Petersburg, which would made them subject to the same limitations as remote facilities (i.e., required to be grinding solids). Following proposed revisions in 1981 and a Notice of Data Availability in 2013, EPA decided not to finalize proposed amendments to the ELGs in 2017, leaving the remote classification in effect per the 1980 petition. EPA concluded that, because all affected facilities are in Alaska, the state of Alaska may set stricter controls on wastewater through NPDES permits wherever the state determined it necessary (U.S. EPA, 2017).

For the purpose of this review, and due to the number of subcategories in the ELGs, EPA divided its review of seafood processors based on location and species processed. Seafood processors with 2019 DMR data fall into five distinct geographic areas: the Pacific Northwest, the Gulf Coast, American Samoa, New England, and Southeast Atlantic. As part of this review, EPA reviewed the 2019 DMR concentration data for regulated pollutants and for top-ranking pollutants.

EPA compared the 2019 DMR concentration data for seafood processors for each regulated pollutant to available effluent data in IWTT for different treatment technologies. EPA found that BOD_5 and TSS concentrations are currently higher than effluent concentrations associated with biological, membrane, and chemical treatment technologies, as documented in IWTT, and are generally located in Alaska and the Gulf Coast. To learn more about these discharges, EPA contacted Alaska Department of Conservation (DEC) and Mississippi Department of Environmental Quality (MDEQ). Alaska DEC confirmed that BOD_5 limits, along with TSS and O&G, are included in permits for processors classified as remote due to water quality standards. Alaska DEC also confirmed that the processors are able to meet permit limits. The majority of facilities on the Gulf Coast, specifically Mississippi and Louisiana, are shrimp processors. According to MDEQ, BOD_5 limits were added to these permits to comply with NSPS limitations following damage from Hurricane Katrina and reclassification of the processors as new sources. MDEQ reports some noncompliance among shrimp processors after implementation of the NSPS limitations.

The top-ranking pollutants from EPA's cross-category concentration analysis include phosphorus, nitrogen, total kjeldahl nitrogen (TKN), and ammonia as N. When broken down by region, the top discharging facilities were in American Samoa and the Gulf Coast. EPA reviewed facility permits and fact sheets, then contacted EPA Region 9 and MDEQ to gather additional information about these discharges. EPA Region 9 is reviewing the two tuna canneries in American Samoa associated with the

top-ranking nutrient concentrations and is requiring the canneries to monitor for any potential pollutants that are being discharged in order to appropriately characterize the wastewater and apply permit limitations where needed. Per MDEQ, nutrient discharges are monitored due to TMDLs in the Mississippi delta and surrounding waters. MDEQ recently began requiring nutrient monitoring for all seafood processors, regardless of receiving water characteristics. In Louisiana, only four of the 55 seafood processors in the 2019 DMR report nutrients data. Given the similar seafood processing and receiving waters, nutrient discharges from Louisiana seafood processors may be similar to those in Mississippi.

Mercury and zinc are being discharged by the same two canneries in American Samoa that EPA reviewed for nutrient discharges. Based on conversations with Region 9, they are monitoring both the mercury and zinc discharges and will apply permit limitations if they are determined to be necessary to meet applicable water quality standards.

EPA is discontinuing review of this category at this time because the issues identified are being addressed at the regional and state levels, which is more appropriate than proposing revisions to the ELGs. EPA recommends that state and local permitting authorities consider applying water-quality based effluent limits or best professional judgement on a case-by-case basis, as appropriate, to address any other potential issues with pollutants in discharges from this category

5.5 Sugar Processing (40 CFR Part 409)

EPA reviewed the Sugar Processing Category because it ranked high in the 2020 cross-category concentration analysis for nutrients, bicarbonate, chlorine, copper, lead, mercury, and sodium (U.S. EPA, 2021c). The Sugar Processing ELGs were published in three parts: beet sugar processing (1974), cane sugar refining (1974), and raw cane sugar processing (1975):

- Subcategory A applies to beet sugar processors. The BPT and BCT regulations include limits for BOD_5, TSS, fecal coliform, temperature, and pH. BAT requirements include a limit for temperature and NSPS requirements are zero discharge. There are no limitations for PSES or PSNS. The limits are based on technology options including extensive recycle and reuse of wastewater during beet processing operations.
- Subcategories B and C apply to cane sugar processors. The BPT, BCT, and NSPS regulations include limits for BOD_5, TSS, and pH. There are no limitations for BAT, PSES, or PSNS. Technology at the time of the ELGs for the control and treatment of cane sugar wastewaters consisted primarily of process control (recycling of water, prevention of sucrose entrainment in barometric refinery and reuse condenser cooling water, recovery of sweet waters), impoundage (land retention), and disposal of process water to municipal sewer systems.
- Subcategories D through H apply to raw cane processors. The BPT and BCT regulations include limits for BOD_5, TSS, and pH or are set to zero discharge. There are no limitations for BAT, PSES, NSPS, or PSNS. EPA identified in-process practices, biological treatment, and surface impoundment as the technology bases for BPT and BCT.

EPA reviewed the 2019 DMR concentration data for both regulated pollutants and top-ranking pollutants. EPA compared the 2019 DMR TSS and BOD_5 concentration data for the Sugar Processing Category to effluent data for different treatment technologies available in IWTT. EPA found that current discharge concentrations of both TSS and BOD_5 from Sugar Processing facilities are within the range of the effluent concentrations in IWTT.

For the top-ranking pollutants, EPA found that the facility with the highest reported concentrations for multiple pollutants had reached a settlement agreement with the Colorado Department of Public Health and Environment (CDPHE). Per that agreement, the facility is currently expanding its wastewater treatment facility (expected to be completed by the end of 2021) to include biological treatment.

The remaining facilities reporting concentrations of the top-ranking pollutants are, for the most part, beet sugar processors. Ammonia concentrations are expected in the barometric condenser wastewater from these facilities due to the higher nitrogen content of beets relative to sugar cane. EPA compared the 2019 DMR discharge concentrations to the underlying concentration data collected during the time of the rulemaking and effluent concentration data in IWTT. Aside from the concentrations associated with the facility in Colorado, EPA's comparison suggested that 2019 DMR Sugar Processing ammonia concentrations are similar to those cited during the rulemaking and are comparable to effluent ammonia concentrations reported in IWTT.

Bicarbonate, sodium, mercury, lead, and copper concentrations may be associated with the manufacturing processes and equipment maintenance. These requirements are included in permits based on water quality criteria and these facilities are not exceeding the permit limitations. Chlorine discharges are associated with disinfection processes at these facilities.

EPA is not prioritizing sugar processing for further review or ELG revision at this time. Based on the available data, revisions to the ELGs are unlikely to result in significant pollutant discharge reductions relative to the other point source categories discussed in this Plan. EPA recommends that state and local permitting authorities consider applying water-quality-based effluent limits or best professional judgment on a case-by-case basis, as appropriate, to address any potential issues with bicarbonate, ammonia, mercury, or other pollutants in discharges from this category.

5.6 Soap and Detergent Manufacturing (40 CFR Part 417)

EPA reviewed the Soap and Detergent Manufacturing (Soap and Detergent) Category because it ranked high in the 2020 cross-category concentration analysis for 19 pollutants (U.S. EPA, 2021c). The top-ranking pollutants include:

- 1,1-Dichloroethylene
- 1,2-Dichloroethane
- Acenaphthylene
- Anthracene
- Benz[a]anthracene
- Benzo(b)fluoranthene
- Benzo[a]pyrene
- Benzo[k]fluoranthene
- Carbon tetrachloride
- Chromium
- Chrysene
- Fluoranthene
- Fluorene
- Foaming agents
- Methylene chloride
- Phenanthrene
- Pyrene
- Toluene
- Vinyl chloride

The Soap & Detergent ELGs, promulgated in 1974 and 1975, apply to facilities that manufacture soap, synthetic organic detergents, and inorganic alkaline detergents. Soap & Detergent subcategories are broadly divided into soap manufacturing (eight subcategories) and detergent manufacturing (11 subcategories). EPA defines soap manufacturing as the production of alkaline metal salts of fatty acids derived from natural fats and oils. EPA defines detergent manufacturing as the production of sulfated and sulfonated cleaning agents from manufactured raw materials, primarily petroleum derivatives. Shampoo, shaving products, and synthetic glycerin manufacturers, as well as specialty cleaners, polishing, and sanitation preparations, are not included in this category.

The BAT limitations for BOD_5, COD, TSS, and O&G are based on best management practices and process improvements that reduce total effluent discharge volume. Foaming agents, or methylene blue activated surfactants (MBAS), are anionic surfactants that EPA identified as a pollutant of concern during the 1975 rulemaking due to their potential contribution to foaming in streams and biological effects from surface effects or toxicity. Anionic surfactants are tested separately from other non-ionic surfactants, which are captured by proxy through BOD_5 and COD monitoring. Limitations for anionic surfactants are only applicable to the detergent manufacturing subcategories. EPA based these limitations on recycling process water, intermittent release of accumulated wash water, and secondary biological treatment for larger operations.

EPA compared the BOD_5, COD, TSS, and O&G 2019 DMR concentration data to available effluent data in IWTT for different treatment technologies. EPA found that current discharge concentrations of these pollutants are within the range of the effluent concentrations available in IWTT.

Based on further review of the top-ranking pollutants, EPA found that the two facilities reporting 16 of the top 19 pollutants are misclassified as Soap & Detergent facilities in EPA's rankings analyses and should be categorized under 40 CFR Part 414 (Organic Chemicals, Plastics, and Synthetic Fibers). Based on permit reviews, the facility operations both fall under the applicability of 40 CFR Part 414 and the permit bases for these discharges are cited as 40 CFR Part 414.

For the remaining top-ranking pollutants, foaming agents, toluene, and methylene chloride, EPA compared 2019 DMR concentration data to effluent concentrations in IWTT and water quality standards. EPA found that the 2019 DMR concentrations are within the range of the IWTT and benchmark data evaluated.

EPA did not prioritize soap and detergent manufacturing for further review or ELG revision. Based on the available data discussed above, revisions to the ELGs are unlikely to result in significant pollutant discharge reductions relative to the other point source categories discussed in this Plan. EPA recommends that state and local permitting authorities consider applying water-quality-based effluent limits or best professional judgement on a case-by-case basis, as appropriate, to address any potential issues with pollutants in discharges from this category.

5.7 Landfills (40 CFR Part 445)

EPA initiated a preliminary review of the Landfills Category based on comments received on Plan 14. Public comments identified landfill leachate as a source of per- and polyfluoroalkyl substances (PFAS) to surface water, groundwater, and POTWs. PFAS are a family of thousands of synthetic organic chemicals that resist natural breakdown, accumulate in the environment and in organisms, and are associated with negative human health impacts. EPA conducted the Landfills Category preliminary review in coordination with the PFAS industrial sources and discharges study (Section 6.4), which investigated PFAS discharges from five additional industrial categories (U.S. EPA, 2021d).

EPA promulgated BPT, BAT, BCT, and NSPS limitations for two subcategories, Subpart A (Hazardous Waste Landfills) and Subpart B (Non-Hazardous Waste Landfills) in a rulemaking in 2000. Subpart A covers Resource Conservation and Recovery Act (RCRA) Subtitle C Hazardous Waste Landfills which are used specifically for the disposal of hazardous waste. Subpart B covers RCRA Subtitle D Non-Hazardous Waste Landfills, which include municipal solid waste (MSW), industrial waste, construction and demolition (C&D) debris, and coal combustion residual (CCR) landfills. EPA identified equalization, chemical precipitation, biological treatment, and multimedia filtration and equalization, biological treatment, and multimedia filtration as the treatment basis for the Subpart A and Subpart B

limitations, respectively. EPA did not establish pretreatment standards for indirect discharges from landfills.

As part of the preliminary category review, EPA evaluated the 2019 DMR concentration data for conventional pollutants and the 14 top-ranking pollutants identified in the 2020 cross-category concentration analysis (Section 5.1). The top-ranking pollutants include:

- Acetone
- Ammonia, as NH3
- Carbon tetrachloride
- Chlorine, total residual
- Chromium, trivalent
- Magnesium
- Manganese
- Naphthalene
- Potassium
- Residue, total filterable
- Sodium
- Sulfide
- Thallium
- Total Kjeldahl Nitrogen

For the 2000 rulemaking, EPA investigated and conducted sampling for 11 of the 14 top-ranking pollutants. EPA did not evaluate Total Kjeldahl Nitrogen; residue, total filterable; or total residual chlorine in this effort. Acetone, carbon tetrachloride, and thallium were not detected in EPA's sampling effort and were not further investigated during the rulemaking. EPA established BPT, BAT, and NSPS limitations for ammonia discharges in Subparts A and B. EPA established BPT, BAT, and NSPS limitations for chromium and naphthalene in limitations in Subpart A only.

EPA compared the BOD_5 and TSS 2019 DMR concentration data to available effluent data in IWTT for different treatment technologies. EPA found that current discharge concentrations of these pollutants are within the range of the effluent concentrations available in IWTT.

As part of its study of PFAS industrial sources and discharges, EPA gathered analytical data published in peer-reviewed literature and state sampling efforts to define PFAS sources at landfills and quantify PFAS concentrations observed in landfill leachate. EPA identified several sources of PFAS in landfills, including PFAS-treated textiles, paper, and packaging materials, C&D waste, and industrial waste from PFAS-related manufacturing processes. PFAS are detected in landfill leachate regardless of waste type or landfill age and have been quantified in concentrations ranging from less than 1 nanogram per liter (ng/L) to over 8,000 ng/L (U.S. EPA, 2021c).

EPA began gathering data to develop a profile of the landfills industry using facility data from EPA's Enforcement and Compliance History Online (ECHO) database and industry breakdowns defined in the 2000 *Development Document for Final Effluent Limitations Guidelines and Standards for the Landfills Point Source Category* (U.S. EPA, 2000). Based on the 2000 rulemaking data, a majority of hazardous waste landfills subject to Subpart A of the ELGs are direct dischargers and a majority of non-hazardous waste landfills subject to Subpart B of the ELGs are indirect dischargers that collect and send wastewater to POTWs. Further research will continue gathering information to estimate the current scope of the industry and their generation and collection of landfill wastewater. See the "Preliminary Category Review Report" (U.S. EPA, 2021c) for further details.

In addition, EPA began investigating treatment technologies at landfills. For the 2000 rulemaking, the technology basis includes equalization, chemical precipitation, biological treatment, and multimedia filtration for Subpart A and equalization, biological treatment, and multimedia filtration for Subpart B. Survey data from the 2000 rulemaking indicate that indirect dischargers typically send wastewater directly to POTWs without pretreatment as it is not required. Indirect dischargers are not subject to pretreatment standards under Part 445 but may have pretreatment in place to meet state or local

requirements. Some landfills may achieve zero discharge through deep well injection, incineration, evaporation, land application, and recirculation (U.S. EPA, 2000). EPA is collecting data (e.g., literature articles, studies) on new pollutant control practices and wastewater treatment technologies being implemented at landfills to address PFAS contamination in leachate. Moreover, EPA is reviewing literature sources gathering data to characterize the impact of landfill leachate on PFAS influent and effluent concentrations in POTW.

The preliminary review results show that further research is needed to address limited data availability including the following:

- Current size and scope of the landfills industry that generates and collects landfill wastewater.
- Analytical data for PFAS discharges from landfills nationwide, particularly direct discharge data on PFAS concentrations other than perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS).
- Profile of indirect discharging landfills including the amount of wastewater they discharge and their impact on POTW influent and effluent PFAS concentrations.
- Current wastewater control practices and treatment technologies in place at landfills and whether there are landfills currently implementing PFAS treatment for leachate.

For this industry category, EPA will continue gathering information addressing areas with limited data by proceeding with a detailed study.

5.8 Industrial Wastewater Treatment Technologies Reviews

EPA continued its industrial wastewater treatment technology review, initially described in Preliminary Plan 14 (see Section 3.6 of Preliminary Plan 14, U.S. EPA, 2021a). EPA has the following goals for the technology reviews:

- Enhance EPA's ability to identify and prioritize industries for further study based on wastewater treatment technology availability, capabilities, and performance in order to understand the range of wastewater characteristics that are treatable and to what level with a given technology. For example, which point source categories might be able to use a technology successfully and which might not.
- Inform industry studies and rulemakings based on advances/changes in wastewater treatment technologies.
- Consolidate wastewater treatment technology background information for future reference and use.
- Collect preliminary information and data on treatment technology costs, where available.
- Investigate the potential for technology transfer from one point source category to others.

EPA's methodology for treatment technology reviews consists of a three-phase approach to identify and prioritize for further review technologies that can inform its ELG planning process. The three phases are: (1) technology screening; (2) preliminary technology review; and (3) technology study.

As identified in Plan 14, EPA selected suspended growth systems (activated sludge), membrane bioreactors (MBR), moving bed biofilm reactors (MBBR), and treatment based on membranes alone for preliminary technology reviews. EPA continued its preliminary review of these four technologies, collecting additional data from IWTT, targeted literature searches, and treatment technology

conferences, where applicable. EPA reviewed these data sources to update information on the treatment removal mechanisms, potential for industrial wastewater applicable, and pollutants targeted for removal.

EPA will gather additional information on the use of membranes for industrial wastewater treatment as a technology review. For example, EPA contacted several membrane treatment vendors to understand the potential application for membranes in wastewater treatment across industrial sectors. To support this effort, EPA solicits comment on the capabilities, performance, and costs of membrane treatment technologies for industrial wastewater.

EPA summarized its current key findings to date for the four treatment technologies mentioned in this section in the *Key Findings for EPA's Industrial Wastewater Treatment Technology Reviews* memorandum (ERG, 2021a) and the preliminary review for suspended growth systems (activated sludge) and membranes (ERG, 2021b and 2021c).

5.9 ELG Planning Tools

EPA continued to populate the IWTT Database and the ELG Database. These databases, described in more detail below, were used to supplement EPA's preliminary category reviews for the 2020 annual review by:

- Estimating the percent of pollutants with ELGs for a specific point source category included in the cross-category concentration analyses (see Section 5.1).
- Comparing current discharge concentrations to effluent data in IWTT and long-term average data, limitation data, and technology bases in the ELG Database.

See EPA's 2020 Preliminary Category Review Report for a description of the specific analyses performed as part of the preliminary category reviews (U.S. EPA, 2021c).

5.9.1 Industrial Wastewater Treatment Technology Database

EPA continued to collect industrial wastewater treatment performance information to populate the IWTT Database and made the information available to the public through the IWTT web application.[23] EPA identified and screened additional references across a broad range of industries from key technical conferences on wastewater treatment, including the 2019 and 2020 Water Environment Federation's Technical Exhibit and Conference. EPA also screened references identified through the Study of Per- and Polyfluoroalkyl Industrial Sources and Discharges (U.S. EPA, 2021d). The IWTT database currently contains performance data for 58 different treatment technologies, some of which may be components of a larger treatment system. The IWTT database contains wastewater treatment technology performance data from 34 industrial PSCs and removal performance data for 205 individual pollutant parameters.

5.9.2 Effluent Limitations Guidelines and Standards Database

As discussed in Plan 14, EPA has compiled information on its ELGs for the 59 different PSCs[24] into a consolidated ELG Database. EPA has now made the information publicly available through the ELG Database web application. Users of this tool can search for information within and across ELGs. The

[23] See https://www.epa.gov/eg/industrial-wastewater-treatment-technology-database-iwtt.

[24] See EPA's Industrial Effluent Guidelines webpage (https://www.epa.gov/eg/industrial-effluent-guidelines) for a list of the 59 point source categories.

database captures information from the Code of Federal Regulations (CFR),[25] as well as from the technical development documents supporting promulgated rules. The ELG Database includes the following information:

- Regulations promulgated (e.g., BPT, BAT, BCT, NSPS, PSES and PSNS).
- Applicability of the ELGs, including definitions of any regulated subcategories.
- Waste streams or process operations associated with each regulation.
- Pollutant limitations.
- CFR references to best management practices, monitoring requirements, and narrative limitations.
- Rule history, including promulgation and revision dates.
- Technology bases for the underlying regulations.

5.10 Environmental Justice

EPA is considering how best to incorporate equity and environmental justice considerations into the ELG planning process. Specifically, EPA is evaluating the use of EJSCREEN, the agency's mapping and screening tool that combines demographic and environmental indicator information, to assess the proximity and potential impact of industrial discharges on underserved and underrepresented populations. EJSCREEN includes 11 EJ indexes[26] which geographically relate (by Census block group) demographic data, including percent low-income, percent people of color, less than high school education, linguistic isolation, and different age groups, and environmental indicator data for air, lead paint, noise, and waste/wastewater. The index is calculated for each Census block group based on how much the local demographics are above the national average.

In this preliminary stage, EPA plans to evaluate the wastewater discharge indicator index, which provides an indication of stream proximity and toxic concentrations that may be associated with industrial wastewater discharges and related demographics data[27]; however, EPA may consider additional air and waste indicators (e.g., particulate matter). EPA may use the EJ wastewater indexes to supplement its screening-level analysis across or within specific point source categories. As this effort is preliminary and still under development, EPA solicits comments from the public on the specific analyses and data sources it might use in its screening-level reviews to account for environmental justice.

[25] See https://www.ecfr.gov/cgi-bin/text-idx?SID=1e3d7a295bbc0feaae8ea6b4b85da954&mc=true&tpl=/ecfrbrowse/Title40/40tab_02.tpl.

[26] See https://www.epa.gov/ejscreen/environmental-justice-indexes-ejscreen.

[27] The Wastewater discharge indicator is calculated from EPA's Risk-Screening Environmental Indicators (RSEI) model, https://www.epa.gov/ejscreen/overview-environmental-indicators-ejscreen.

6. ONGOING ELG STUDIES

This section summarizes the status of EPA's ongoing ELG studies.

6.1 Detailed Study of Electrical and Electronic Components Category (40 CFR Part 469)

As the result of the 2015 Annual Review (U.S. EPA, 2016), EPA decided to conduct a detailed study of the Electrical & Electronic Components Category (40 CFR Part 469). The E&EC ELG was issued in 1983 and has not been revised. The intent of the study is to determine whether, in light of changes implemented and innovations achieved by this industry, revisions to the existing ELGs are warranted.

As part of the detailed study of the E&EC industry, EPA has identified a population of facilities that are subject to the current regulation. EPA obtained discharge permits and monitoring data from over 100 such facilities, which, taken together, provide information on treatment technologies being used and the concentrations of contaminants in the facilities' wastestreams. EPA has used these data to develop a profile of the regulated community. EPA has conducted five site visits, all of which yielded valuable information regarding manufacturing techniques, chemicals used, and changes to the industry since the 1983 rule was issued. EPA has held discussions with regulatory authorities in at least 11 states to discuss regulatory concerns related to this ELG.

EPA is in the process of finalizing a study report to document this review. EPA will evaluate next steps after the report is complete and will provide an update on this study in the upcoming Effluent Guidelines Program Plan 15.

6.2 Study of Meat and Poultry Products Point Source Category (40 CFR Part 432)

As described in ELG Program Plan 14, EPA initiated a detailed study of wastewater discharges from the Meat and Poultry Products Category (40 CFR Part 432). This was a result of the cross-industry review of nutrients in industrial wastewater and of the Meat and Poultry Products (MPP) Preliminary Category Review. The MPP industry includes facilities that slaughter and/or further process meat and poultry and/or perform rendering operations. A goal of this study was to gain a more complete understanding of the total number of facilities, the locations of the facilities across the United States, the sizes of the facilities, the characteristics of their processes and their wastewater, and current wastewater treatment technologies used to evaluate whether the ELG should be revised.

To date, EPA has collected publicly available information from various sources to construct a picture of the industry's facilities, discharge practices, control technologies currently in place, and the effectiveness of nutrient removal. This information was also used to identify candidates for site visits, to identify other treatment technologies that may be available to the industry to treat their wastewater beyond the current ELG requirements, to identify documented environmental or human health impacts associated with MPP facilities, and to determine the proximity of MPP wastewater discharges to impaired waters, and communities with environmental and demographic characteristics of concern.

EPA evaluated industry directories from the U.S. Department of Agriculture (USDA) Food Safety Inspection Service (FSIS), the U.S. Food and Drug Administration (FDA), and the National Renderers Association to obtain a list of facilities potentially included in the MPP industry. To further develop this list, EPA has also evaluated information from POTW Annual Reports, EPA's ICIS-NPDES database, and EPA's TRI database.

EPA recognizes that it is important to engage with the water sector and agricultural and meat processing stakeholders early in the process. Therefore, EPA conducted outreach and engagement with EPA

Offices, Regions and States, clean water organizations, and other Federal Agencies, such as the USDA and the FDA.

EPA reached out to the clean water organizations that represent the POTWs, the National Rural Water Association (NRWA) and National Association of Clean Water Agencies (NACWA) to get a better understanding of POTW impacts by MPP facilities. EPA also engaged with Industry Stakeholders such as US Poultry and Egg Association, National Cattlemen's Beef Association, North American Meat Institute and National Pork Producers Council to understand their perspectives and gain insights into the industry. EPA also met with community and environmental groups to understand their perspectives and those of the communities living near MPP facilities and using the waters downstream from MPP discharges.

The following summarizes the findings to date:

- The MPP industry discharges the highest phosphorus levels and second highest nitrogen levels of all industrial categories, these pollutants are at concentrations that can be reduced with current wastewater treatment technology, the discharges are from numerous facilities across the industry, and some facilities are already removing nutrients, achieving effluent concentrations well below the limitations in the existing MPP ELGs.
- The existing ELGs apply only to about 300 of the estimated 7,000 MPP facilities nationwide. The ELGs only apply to facilities that directly discharge wastewater to surface waters; they do not include pretreatment standards for facilities that indirectly discharge via publicly owned treatment works (POTWs).
- In addition to concern about the discharge of effluents directly into the Nation's waters, EPA is also concerned about pollutants in wastewater discharged through sewers flowing to POTWs. Data indicate that MPP facilities are causing problems for POTWs that receive MPP wastewater via indirect discharges. For example, a review of 200 indirect MPP facilities shows that 73% of the POTWs receiving MPP wastewater have violation(s) of permit limits for pollutants found in MPP wastewater. Pollutants include nitrogen, phosphorus, TSS, BOD, oil and grease, chloride, total residual chlorine, coliform bacteria (e.g., *E. coli)*, and metals. Of the more than one hundred corresponding POTW discharge permits reviewed, only 45% have nitrogen limits and only 15% have phosphorus limits, which indicates that many POTWs may not be removing much of the nutrient load discharged to POTWs from MPP industrial users.
- National ELGs and pretreatment standards can help ensure make sure people in all areas in the vicinity of industrial direct and indirect discharges receive the same degree of protection from environmental and health hazards, and equal access to the decision-making process to have a healthy environment in which to live, learn, and work. To address Environmental Justice considerations, EPA conducted screening analyses of areas with MPP facilities and found 74% of MPP facilities that directly discharge wastewater to surface waters are within one mile of census block groups with demographic or environmental characteristics of concern.[28] This indicates that such facilities may be disproportionately impacting communities of concern.

[28] Characteristics of concern in this analysis are defined as demographic or environmental indexes above the 80th percentile in a state based on data available in the 2020 release of EJSCREEN. Census block groups with one or more indexes above this threshold were considered communities of concern.

- Data also show that 120 of approximately 300 direct discharge facilities discharge to waters listed as impaired under section 303(d) of the CWA, and over 40 percent of TN and TP load is discharged to waters impaired for algal growth, ammonia, nutrients and/or oxygen depletion.
- In addition to nutrients, the DMR data indicate that MPP facilities discharge 63 unique pollutants and 17 metals.

The data reviewed to date indicates that a revision of the ELG may be appropriate. As such, EPA is concluding its study and is initiating a rulemaking to revise the Meat and Poultry Products Category ELGs, as appropriate. EPA solicits public input on this announcement.

6.3 Study of Oil and Gas Extraction Wastewater Management

In Final ELG Program Plan 14, EPA announced that it was initiating rulemaking to revise definitions in the Centralized Waste Treatment (CWT) ELGs (40 CFR Part 437) to increase flexibility for CWT facilities that treat and discharge produced water from oil and gas extraction. EPA indicated plans to propose revising 40 CFR Part 437 to expand the beneficial use of treated produced waters by allowing, under certain circumstances, the discharge of produced waters from CWT facilities and from POTWs. EPA indicated that these revisions would allow more flexibility in the discharge and management of treated produced waters for use in agricultural, reuse for oil recovery, and other uses to alleviate water scarcity.

After further consideration, EPA intends to take no further action on oil and gas extraction wastewater management and will not move forward with revisions to the CWT ELGs at this time. The agency has determined that the current regulations provide sufficient flexibility for managing produced waters at the national level at this time. EPA is aware that several states are conducting technical evaluations of the management, treatment, and regulation of produced water discharges in their states. EPA will continue to monitor and evaluate state-level activities and may re-visit regulatory changes to address produced water discharges if industry practices change.

6.4 Study of Per- and Polyfluoroalkyl Industrial Sources and Discharges

Along with Preliminary Plan 15, EPA is publishing the *Multi-Industry Per- and Polyfluoroalkyl Substances (PFAS) Study - 2021 Preliminary Report* (U.S. EPA, 2021d). The report presents the results to date of EPA's study of industrial PFAS manufacturing, use, treatment, and discharge to surface water and POTWs. The report focuses on five PSCs: organic chemicals, plastics and synthetic fibers (OCPSF); metal finishing; pulp, paper, and paperboard; textile mills; and commercial airports. As part of the detailed study, EPA collected facility-specific information such as the types of PFAS compounds discharged, discharge concentrations, treatment methods, and facility flow rates. This information was primarily collected through outreach to stakeholders, including company representatives and trade associations, state, regional, and local wastewater regulatory authorities, treatment technology vendors, and non-governmental organizations.

While there has been significant study in recent years of the presence of PFAS in the environment, and the presence of PFAS in drinking water, there has been relatively little study of the discharges of PFAS to surface water and POTWs. As a result, there is limited information about PFAS discharges, including the types of PFAS compounds discharged, concentrations of PFAS discharged, and the significant sources of PFAS discharges. EPA solicits comment on the information and data regarding these five point source categories that EPA has collected to date. EPA has evaluated the following information to inform decisions about how best to address industrial PFAS discharges:

6.4.1 PFAS Manufacturers and Formulators

Based on information and data collected, EPA determined that PFAS have been and continue to be manufactured and used by PFAS manufacturer facilities, a subset of facilities regulated under the OCPSF ELG (40 CFR Part 414), in the U.S. The types and quantities of PFAS manufactured and used varies by facility and have changed over time. Through outreach to industry and data collection, EPA identified six OCPSF facilities that currently manufacture PFAS in the U.S. through electrochemical fluorination, fluorotelomerization, or other processes. The PFAS feedstocks may be further processed on site or transferred to other facilities where they are blended, converted, or integrated with other materials to produce new commercial or intermediate products, such as plastic, rubber, resins, coatings, and cleaning products. EPA identified eight additional OCPSF facilities that use PFAS feedstocks to formulate other products. EPA has not developed a comprehensive list of all PFAS manufacturers and formulators in the U.S. and considers it probable that there are many more OCPSF facilities using PFAS that EPA has not yet identified.

EPA determined that the manufacture or formulation of PFAS may generate wastewaters containing PFAS. EPA verified that PFAS, including legacy long-chain PFAS and short-chain replacement PFAS, are present in wastewater discharges from OCPSF facilities to surface waters and POTWs. EPA estimated the types and quantity of PFAS present in wastewater discharges from these facilities using available sampling data. For both PFAS manufacturers and formulators, average concentrations of short-chain perfluoroalkyl carboxylic acids (PFCAs) and perfluoroalkane sulfonic acids (PFSAs) were generally higher relative to long-chain PFCAs and PFSAs. EPA identified two OCPSF facilities that have reduced effluent concentrations of PFAS using granulated activated carbon (GAC) treatment.

On March 17, 2021, after publishing the January 2021 Final Plan 14, EPA published an advance notice of proposed rulemaking (ANPRM): "Clean Water Act Effluent Limitations Guidelines and Standards for the Organic Chemicals, Plastics and Synthetic Fibers Point Source Category," which provided for public review of and comment on the information and data regarding PFAS manufacturers and formulators that EPA has collected to date. EPA requested public comment on the collected information and data and solicited additional information and data regarding manufacturers and formulators of PFAS and the presence and treatment of PFAS in discharges from these facilities. Comments on the ANPRM were due to EPA on or before May 17, 2021. These comments, along with data and information received in response to the ANPRM, will inform the development of wastewater discharge requirements for these facilities.

Based on the information collected through the Preliminary Multi-Industry PFAS Study, EPA has determined that the development of effluent guidelines and standards for PFAS manufacturers is warranted. EPA therefore plans to revise the existing OCPSF ELGs (40 CFR Part 414) to address PFAS discharges from facilities manufacturing PFAS. Additionally, EPA will continue to evaluate the need to develop regulations to address PFAS discharges from PFAS formulators. EPA solicits public input on this announcement.

6.4.2 Metal Finishing

Based on information and data EPA has collected since it began studying PFAS in industrial wastewater, EPA determined that PFAS have, and continue to be, used by metal finishing facilities in the United States. EPA identified chromium electroplating and chromium anodizing operations (collectively referred to as "chromium electroplating facilities") as the most significant source of PFAS in the metal finishing point source category due to their use of PFAS-based mist/fume suppressants to control toxic hexavalent chromium emissions. EPA determined that the use of PFAS-based mist/fume suppressants

may generate PFAS-containing wastewaters. EPA verified that PFAS, including legacy long-chain PFAS and short-chain replacement PFAS, are present in wastewater discharges from chromium electroplating facilities to surface waters and POTWs. EPA did not identify any chromium electroplating facilities with PFAS effluent limitations or pretreatment standards in their wastewater discharge permits. Most chromium electroplating facilities are not monitoring for PFAS and may continue to discharge PFAS to POTWs or surface waters. EPA identified several Michigan chromium electroplating facilities that have reduced effluent concentrations of PFAS using GAC treatment.

Based on the information collected through the Preliminary Multi-Industry PFAS Study, EPA has determined that the development of effluent guidelines and standards for chromium electroplating facilities is warranted. EPA therefore plans to revise the existing Metal Finishing ELGs (40 CFR Part 433) to address PFAS discharges from chromium electroplating facilities. EPA solicits public input on this announcement.

6.4.3 Pulp, Paper, and Paperboard

Based on information and data EPA collected for the Preliminary Multi-Industry PFAS Study, EPA determined that PFAS have been and continue to be used by U.S. pulp, paper, and paperboard facilities. However, only a small subset of facilities are actively applying PFAS to paper products. Information EPA has collected indicates that the industry phased out the use of PFOA and PFOS approximately a decade ago but continues to use FDA-approved short-chain PFAS in limited quantities for the manufacture of food contact packaging and specialty paper products. The industry is expected to transition to PFAS-free technologies and eliminate all application of PFAS in their U.S. pulp and papermaking operations by 2024. This schedule coincides with an FDA agreement with chemical manufacturers to voluntarily phase out use of PFAS that contain or may degrade to 6:2 fluorotelomer alcohol (6:2 FTOH) in food contact applications by 2024.

EPA did not identify any pulp, paper, and paperboard facilities with PFAS effluent limitations or pretreatment standards in their wastewater discharge permit and determined that only a small fraction of facilities monitor for PFAS. Although industry reports the application of PFAS to pulp, paper, and paperboard products is typically a dry or closed-loop process and may not generate a wastewater stream, EPA determined that PFAS, including legacy long-chain PFAS and short-chain replacement PFAS, are present in wastewater discharges from pulp, paper, and paperboard facilities to surface waters and POTWs. The presence of PFOA, PFOS, and other long-chain perfluoroalkyl acids (PFAAs) may be due to legacy issues or degradation of other more complex PFAS.

EPA will continue to study this point-source category with particular attention to understanding the potential for legacy discharges from these facilities after the industry's transition to PFAS-free additives. EPA solicits public input on additional data and information regarding PFAS use and discharge from the pulp and paper manufacturing industry that should be reviewed as part of this study. EPA intends to provide updates on these activities in subsequent ELG program plans.

6.4.4 Textile and Carpet Manufacturers

Based on information and data EPA collected for the Preliminary Multi-Industry PFAS Study, EPA determined that PFAS have been and continue to be used by textile and carpet manufacturers, a subset a subset of facilities regulated under the Textile Mills ELGs (40 CFR Part 410), in the U.S. EPA's review of PFAS use and discharge by the textile mills point source category is largely based on publicly available information and literature. EPA attempted to meet with industry trade associations and companies to collect, on a voluntary basis, information on the use and discharge of PFAS for textile and

carpet mills. The industry trade associations and companies that EPA contacted, however, declined to meet with EPA or provide information. Based on a small number of sample results, EPA determined that PFAS, including legacy long-chain PFAS, are present in wastewater discharges from textile mills to POTWs. Most textile mills are not monitoring for PFAS and may be discharging PFAS to POTWs or surface waters.

EPA plans to continue to study textile and carpet manufacturers in a separate detailed study. EPA will continue to collect and review information and data on the use, treatment, and discharge of PFAS from these industries. EPA intends to provide updates on these activities in subsequent ELG program plans.

6.4.5 Commercial Airports

The Federal Aviation Administration (FAA) Reauthorization Act of 2018 (enacted October 5, 2018) mandates that the FAA can no longer require the use of PFAS-based aqueous film-forming foam (AFFF) by Part 139 airports no later than three years from the date of enactment (October 4, 2021). As a result, the FAA has approved, encourages use of, and in some cases funds four different types of AFFF testing equipment that do not require dispensing AFFF when airports conduct periodic equipment testing and training (FAA, 2021). The FAA has also built a research testing facility and has conducted over 400 tests in an effort to find a new fluorine-free alternative firefighting extinguishing agent. (FAA, 2019)

Historically, the FAA required that commercial airports certified under 14 CFR Part 139 purchase only firefighting foams that conform to military specification (Mil-Spec) MIL-PRF-24385 for performance and procurement (FAA, 2006). In May 2019, the DOD amended Mil-Spec MIL-PRF-24385 to remove the requirement that AFFF must contain PFAS. As of July 2021, all firefighting foam formulations that meet MIL-PRF-24385 contain less than 800ppb of PFAS. The FAA and the DOD are continuing to collaborate on research and to test fluorine-free alternatives that provide the same level of safety currently offered by Mil-Spec MIL-PRF-24385.

Based on this information, EPA determined that commercial airports may generate PFAS-containing wastewater from live-fire firefighting training, emergency response activities, and accidental leaks from stockpiles of AFFF. The volume of PFAS released to the environment can vary depending on the activity, types of controls employed by the airport, and type and volume of AFFF released.

EPA is not prioritizing a rulemaking on this category at this time, however EPA will continue to study commercial airport use of AFFF that contains PFAS. EPA solicits public input on additional data and information regarding AFFF use and discharge that should be reviewed as part of this study. EPA intends to provide updates on these activities in subsequent ELG program plans.

7. ONGOING ELG RULEMAKING

This section summarizes the status of EPA's ongoing ELG rulemaking efforts.

7.1 Steam Electric Power Generating Point Source Category (40 CFR Part 423)

EPA promulgated new ELG's for the Steam Electric Power Generating PSC in 2015 and revised them in 2020. The rules are subject to legal challenge in the U.S. Court of Appeals for the Fifth and Fourth Circuits, respectively. The legal challenges to the 2015 ELGs for flue gas desulfurization (FGD) wastewater and bottom ash (BA) transport water have been held in abeyance since EPA commenced the 2020 rulemaking. EPA completed its reconsideration rulemaking for FGD wastewater and BA transport water in August 2020, establishing effluent limitations for FGD wastewater and BA transport water. Meanwhile, the Court proceeded to hear claims on aspects of the 2015 rule that were not the subject of EPA's reconsideration rulemaking. On April 12, 2019, the U.S. Court of Appeals for the Fifth Circuit struck down as unlawful aspects of the 2015 ELGs pertaining to effluent limitations for "legacy" wastewater and combustion residual leachate. The Court vacated those portions of the 2015 ELG rule and remanded them to the agency.

On July 26, 2021, EPA announced that it is initiating a rulemaking process to strengthen certain wastewater pollution discharge limitations for coal power plants that use steam to generate electricity. EPA undertook a science-based review of the 2020 Steam Electric Reconsideration Rule under Executive Order 13990, finding that there are opportunities to strengthen certain wastewater pollution discharge limitations. For example, treatment systems using membranes have advanced since the 2020 rule's issuance and continue to rapidly advance as an effective option for treating a wide variety of industrial pollution, including from steam electric power plants. EPA expects this technology to continue advancing and the agency will evaluate its availability (as defined in the Clean Water Act) as part of the new rulemaking. While the agency pursues this new rulemaking process for coal power plants, the current regulations will be implemented and enforced. These requirements provide significant environmental protections relative to a 1982 rule that was previously in effect. The 2015 and 2020 rules are leading to better control of water pollution from power plants while reducing the cost of controls such as biological treatment systems and membrane treatment systems. The agency's approach will secure progress made by the 2015 and 2020 rules while the agency undertakes a new rulemaking to consider more stringent requirements.

EPA intends to publish a proposed rule in the fall of 2022.

8. REFERENCES FOR PRELIMINARY PLAN 15

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United States
Environmental Protection
Agency

EPA's Review of Industrial Wastewater Discharge Monitoring Report (DMR) Data for Preliminary Program Plan 15

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List of Acronyms

CWA	Clean Water Act
DMR	Discharge Monitoring Report
ECHO	Enforcement and Compliance History Online
ELG	Effluent limitations guidelines and standards
GPD	Gallons per day
ICIS-NPDES	Integrated Compliance Information System for the National Pollutant Discharge Elimination System
kg/d	Kilograms per day
Loading Tool	Water Pollutant Loading Tool
MGD	Million gallons per day
mg/L	Milligram per liter
NAICS	North American Industry Classification System
NODI	No Data Indicator
NPDES	National Pollutant Discharge Elimination System
PSC	Point Source Category
SIC	Standard Industrial Classification
WET	Whole Effluent Toxicity

1. Introduction

Effluent limitations guidelines and standards (ELGs) are an essential element of the nation's clean water program, established by the 1972 amendments to the Clean Water Act (CWA). ELGs are technology-based regulations used to control pollution in industrial wastewater discharges. This regulatory program substantially reduces industrial wastewater pollution and continues to be a critical aspect of the effort to clean the nation's waters.

Per CWA requirements, EPA annually reviews all industrial point source dischargers to identify existing ELGs that are potential candidates for revision[1] and to identify new point source categories (PSCs) for the potential development of ELGs.[2] As part of EPA's 2020 review of ELGs, EPA evaluated 2019 concentration data reported by industrial facilities on discharge monitoring reports (DMRs). This analysis, referred to as the cross-category concentration analysis, compared facility wastewater discharge pollutant concentrations across industrial PSCs to identify categories that have relatively high pollutant concentration discharges compared to other PSCs and provided a means of prioritizing specific PSCs for further review and study. EPA first performed this analysis for its 2019 annual review of ELGs using 2017 concentration data. See *EPA's Review of Industrial Wastewater Discharge Monitoring Report (DMR) Data* for details of the 2019 annual review analysis (U.S. EPA, 2020). EPA used updated DMR data and generally employed the same methodology for this current review, with minor adjustments as discussed in this report.

This report presents the data quality review, methodology, considerations, findings, and next steps from EPA's cross-category concentration analysis using 2019 DMR concentration data.

2. Cross-Category Concentration Analysis Data Sources and Methodology

EPA analyzed pollutant discharge concentrations using publicly available industrial wastewater discharge data to rank categories by the concentration of pollutants in their discharges relative to other PSCs. This section discusses the data sources and the methodology used for the cross-category concentration analysis.

2.1 Data Supporting the Cross-Category Concentration Analysis

For this analysis, EPA evaluated available industrial wastewater discharge data reported on DMRs. Facilities that directly discharge wastewater to surface waters of the United States pursuant to a National Pollutant Discharge Elimination System (NPDES) permit are required to report monitoring data via DMRs for pollutants listed in their NPDES permits. Facilities send DMRs electronically to their respective NPDES permitting authority (state or EPA). The DMR data are stored in EPA's centralized program database, Integrated Compliance Information System for the National Pollutant Discharge Elimination System (ICIS-NPDES).

2.1.1 Use and Considerations of Discharge Monitoring Report Data

ICIS-NPDES captures pollutant-specific permit limits, monitoring requirements, and DMR data, including, but not limited to, facility-, outfall-, and monitoring-period-specific pollutant discharge concentrations, quantities, and wastewater flows. With more than 375,000 industrial facilities permitted for wastewater discharges to waters of the United States in 2019 (ERG, 2021), the ICIS-NPDES database continues to be

[1] See CWA sections 304(b), 301(d), 304(m)(1)(A) and 304(g), 33 U.S.C. 1314(b), 1311(d), 1314(m)(1)(A) and 1314(g).
[2] See CWA sections 304(m)(1)(B), 33 U.S.C. 1314(m)(1)(B), and CWA section 307(b), 33 U.S.C. 1317(b).

the most comprehensive data source quantifying pollutants discharged directly to surface waters of the U.S.

The data collected in the ICIS-NPDES system are particularly useful for ELG planning and this analysis for the following reasons:

- ICIS-NPDES is national in scope, including data from all 50 states and 21 U.S. territories/tribes.
- DMR data included in ICIS-NPDES are based on effluent chemical analysis and metered flows using known analytical methods.
- ICIS-NPDES includes discharge data for all facilities with NPDES permits; therefore, the data are not limited to certain industries.

For these reasons, EPA has historically used DMR data for its annual reviews as a screening tool to evaluate industrial wastewater discharges. EPA identified the following limitations of DMR data collected in the ICIS-NPDES data system:

- ICIS-NPDES contains data only for pollutants that a facility is required by its permit to monitor; the facility is not required to monitor or report all pollutants discharged.
- ICIS-NPDES does not include data characterizing discharges from industrial facilities to POTWs (indirect discharges).
- Facilities enter DMR data manually, which sometimes results in transcription errors (e.g., data entered into the wrong field or reported with an incorrect unit of volume or time).
- ICIS-NPDES contains data on the permitted feature (e.g., external outfall) but does not explicitly identify the type of wastewater being discharged (e.g., process wastewater, stormwater, noncontact cooling water). In some cases, this information may be deduced from the name or description of the outfall reported by the facility; however, total flow rates reported may include non-process wastewater, such as stormwater and noncontact cooling water, as well as process wastewater.

Despite these limitations, EPA determined that the ICIS-NPDES data are a robust and reliable source of information on industrial wastewater discharges, particularly for this initial screening-level review. EPA considered these limitations while developing the methodology of the cross-category concentration analysis discussed throughout this report.

EPA downloaded the following three sets of DMR data from ICIS-NPDES for calendar year 2019:

- 2019 DMR Industrial Monthly Average Concentration Data (ERG, 2020b)
- 2019 DMR Industrial Monthly Average Quantity Data (ERG, 2020c)
- 2019 DMR Flow Data (ERG, 2020d)

EPA used 2019 data for this review because they were the most recent and complete set of industrial wastewater discharge data available when this review began.

To simplify the analysis and focus the cross-category concentration analysis on toxic and nonconventional pollutants, EPA excluded conventional pollutants,[3] pollutants in drilling fluid, pollutants measured in units that are not comparable with units for the concentration or quantity data (e.g., percent), and whole effluent toxicity (WET) parameters (ERG, 2020e). EPA may choose to include these pollutants in subsequent reviews. The raw data sets listed above include the pollutants reported by facilities.

[3] CWA section 304(a)(4) designates the following as conventional pollutants: biochemical oxygen demand (BOD_5), total suspended solids, fecal coliform, pH, and any additional pollutants defined by the Administrator as conventional. The Administrator designated oil and grease as an additional conventional pollutant on July 30, 1979 (44 FR 44501).

Facilities may monitor and report concentration and quantity data for different statistical bases (i.e., averages, maximums, or minimums) and frequencies (e.g., annually, monthly, or daily) depending on their NPDES permit requirements. To maintain comparability between data reported by facilities and account for variability of the data throughout the year, EPA used concentration and quantity data reported as monthly averages in this analysis. See Appendix B of *EPA's Review of Industrial Wastewater Discharge Monitoring Report (DMR) Data* (EPA's cross-category concentration analysis report for the 2019 annual review) for more information on the statistical bases and methodology for identifying monthly average concentrations (U.S. EPA, 2020).

For each of the three DMR datasets downloaded from ICIS-NPDES, EPA captured facility information for the list of included pollutants for each monitoring period in 2019. Facility information included the following elements at the least; additional data were available for some facilities:

- NPDES permit number.
- Standard Industrial Classification (SIC) code.
- External outfall number.
- Permit limit set identifier,4 if applicable.
- Permit limit, if applicable.
- Pollutant name.
- Monitoring period dates.
- Monthly average concentration (mg/L), monthly average quantity (kg/d), or all reported flow (MGD) values, as available, respective to the datasets listed above.
- No Data Indicator (NODI) code.[5]

EPA imported and processed the datasets in a static database to preserve the integrity of the data and facilitate subsequent analyses (ERG, 2020a).

2.1.2 Linking Facilities to PSCs

EPA used established crosswalks maintained in the Water Pollutant Loading Tool (Loading Tool) documentation to relate individual facility and reported pollutants to the most appropriate PSC, commonly based on the facility's primary reported SIC or North American Industry Classification System (NAICS) code.[6] These links enable EPA to analyze discharges within and across PSCs. The Loading Tool was developed by EPA to explore and analyze DMR data. See Section 3 of the *Technical Users Background Document for the Discharge Monitoring Report (DMR) Pollutant Loading Tool* (Loading Tool Technical Users Document) for more information on these crosswalks (U.S. EPA, 2012). EPA updates and refines the facility to PSC crosswalk as it gathers updated information, or, in some cases, performs a facility-specific assessment of the process operations generating wastewater. The crosswalk is available for download on the Loading Tool Resources webpage.

2.1.3 2019 DMR Data Quality Review

For this analysis, EPA evaluated the completeness, accuracy, and reasonableness of the downloaded 2019 DMR data as follows.

[4] A permit limit set is a unique identifier associated with a group of limits in a permit. This identifier is particularly useful when a permit limit includes multiple limits for the same pollutant(s).
[5] The no data indicator (NODI) code indicates the reason that data for an expected DMR value were not submitted by the permittee for a monitoring period end date.
[6] EPA did not review facilities that do not have an industrial classification (did not report a SIC code), facilities that report a SIC code of 4952 (publicly and privately-owned treatment works), and facilities that report a SIC code but are not industrial facilities.

Completeness. EPA assessed completeness of the datasets by comparing the volume of the 2019 downloaded ICIS-NPDES data to that of the 2017 data to ensure that there was no discrepancy that would indicate an incomplete download of the overall data. Table 1 compares the overall count of facilities and records reported in 2017 and 2019.

As expected, the 2019 concentration and quantity datasets were larger than the 2017 dataset, as new facilities or pollutants may be added each year as permits are developed or revised.

Table 1. Results of the 2019 DMR Data Completeness Check

Check	Data Type	2017 Count	2019 Count	Percent Change from 2017 to 2019
Total size of dataset (Number of Records)	Concentration	1,978,642	2,199,584	10% Increase
	Quantity	308,081	309,832	0.57% Increase
Number of Facilities	Concentration	30,566	31,239	2.2% Increase
	Quantity	12,412	12,323	0.72% Decrease

Sources: ERG, 2020b, 2020c, 2020d.

Accuracy and reasonableness. EPA also evaluated the accuracy and reasonableness of the data. EPA compared the smallest and largest reported monthly average concentrations or quantities within a monitoring period from 20 randomly selected facilities representing a variety of states and industries, with the data on EPA's Enforcement and Compliance History Online (ECHO) website to ensure that the values were accurate. Subsequently, for each of these facilities, EPA compared the smallest and largest reported concentrations or quantities to monthly average concentration or quantity for a pollutant across several years of reported data using effluent charts[7] on the ECHO website. See *2019 DMR Data Quality Checks* for the results of this data quality check (ERG, 2020f). EPA did not identify any inconsistencies with data for these 20 facilities for 2019, nor in any other reporting years, indicating that the data downloaded are accurate and reasonable.

Because the reported flow values affect the calculated concentration for the quantity-based data (see Section 2.1.1 for the method used to calculate concentrations), EPA reviewed and corrected flow values exceeding 5,000 MGD. Consistent with the methodology developed in the Loading Tool (see Section 3.1.2 in the Loading Tool Technical Users Document), EPA assumed that flow values above 5,000 MGD were incorrectly reported in units of gallons per day. As a result, EPA corrected these values by dividing the flow by 1,000,000. EPA corrected flow values from 76 facilities within the static database and used the corrected data in its analyses (ERG, 2020a).

Based on these checks, EPA determined that the downloaded 2019 DMR data were useable for the cross-category concentration analysis. EPA will conduct a separate quality review of the data for the PSCs that are prioritized for further review.

2.2 Cross-Category Concentration Analysis Methodology

This section discusses the preparation of the data for use in the analysis (Section 2.2.1), the methodology for prioritizing point source categories for further review (Section 2.2.2), and considerations of the analysis (Section 2.2.3).

[7] A facility's ECHO effluent charts may be accessed through a Facility Name/ID search and clicking on the "E" link under Reports in the search results (https://echo.epa.gov/).

2.2.1 *Data Preparation*

To prepare the data for analysis, EPA: (1) quantified data reported as non-detect, and (2) calculated discharged concentrations of pollutants from reported quantity and flow data (when reported concentration data were not available). EPA then combined all reported and calculated concentration data for use in its cross-category concentration analysis.

Quantifying Data Reported as Below Detection Limits

Facilities may report a monitoring period value (in this case, the monthly average concentration or quantity) as below detection in one of two ways: (1) enter the detection limit as the value, preceded by a "less than" (<) symbol or (2) report a NODI value of "B" to indicate the measured value is below the detection limit. Consistent with its approach in previous ELG planning reviews, EPA handled data reported below the detection limit as follows:

- If a facility reported all monthly average concentrations or quantities in 2019 as below the detection limit for a pollutant, EPA used a concentration or quantity of zero for that pollutant.
- If a facility reported some monthly average concentrations or quantities as below the detection limit and other values above the detection limit in 2019 for a pollutant, EPA replaced the non-detected values with a value equal to one-half the detection limit, because the pollutant is reasonably expected to be present in the facility's wastewater.

Calculating Concentrations from Reported Quantity Data

Depending on the permit requirements, some facilities may report wastewater discharges as quantities discharged over time (e.g., kg/d) rather than concentrations. To directly compare all discharges within and across pollutants and PSCs, EPA calculated discharge concentrations of pollutants from reported quantity and flow data, if necessary, as described below.

EPA identified the reported flow rate value associated with each reported quantity value by matching the NPDES permit, outfall, monitoring period, and permit limit set.[8]

1. EPA excluded flows that did not represent industrial process waste streams, inferred from the flow name. If the flow parameter was identified as an overflow volume, stormwater flow, pump outflow, ballast water flow, and sanitary waste flow, EPA excluded the flow value from the cross-category concentration analysis.
2. Of the flows identified as industrial process wastewater streams, if the quantity value lacked a corresponding flow value, or if the flow value was zero, EPA did not calculate a concentration from the quantity data, and the value was excluded from the cross-category concentration analysis. There were 16,035 quantity records (approximaetly 5 percent of quantity records) that lacked a corresponding flow value or reported a flow value of zero.
3. If the quantity value had exactly one corresponding flow value, EPA used the flow value and the reported quantity value to calculate a concentration.
4. If the quantity value had more than one corresponding flow value for a monitoring period (e.g., the facility reported an average, total, and/or maximum flow), EPA selected flow values based on a hierarchy of the statistical bases (e.g., average, total, maximum) and flow parameter description. This hierarchy, developed for the Loading Tool, prioritizes use of average flow values, then the total, then the maximum flow values, when available. See Appendix E of *EPA's Review of Industrial Wastewater Discharge Monitoring Report (DMR) Data* (EPA's cross-category concentration analysis report for the 2019 annual review) for the table showing the hierarchy of

[8] A permit limit set is a unique identifier associated with a group of limits in a permit. This identifier is particularly useful when a permit limit includes multiple limits for the same pollutant(s).

flow parameters used to calculate concentrations from reported quantity data. EPA used the prioritized flow value and the reported quantity to calculate a concentration.

Combining Reported and Calculated Concentrations into a Dataset

EPA combined the calculated monthly average concentration data with reported monthly average concentration data for all facilities and all monitoring periods (considering quantified non-detect values) into a static database for use in the cross-category concentration analysis. If a facility reported both a concentration and a quantity for the same monitoring period, parameter, and outfall, EPA prioritized the reported concentration over the calculated concentration derived from the quantity value to avoid double counting data. EPA then averaged the monthly average concentrations from 2019 (both reported and calculated) to calculate a single 2019 average monthly concentration for each pollutant reported for each facility that could be compared with other facilities for use in the cross-category concentration analysis (ERG, 2020a).

2.2.2 Methodology

The cross-category concentration analysis consists of the following steps described in this section. This analysis compares wastewater discharge pollutant concentrations across PSCs for multiple pollutants to identify categories that have relatively higher pollutant concentration discharges compared to other PSCs and provides a means of prioritizing specific PSCs for further review and study. Following each of the steps, EPA presents an example of the cross-category analysis methodology as applied to one pollutant or PSC, depending on the step.

Step 1: Calculate Median Pollutant Concentrations by PSC

From the concentration dataset, EPA grouped facilities into PSCs using the facility-to-PSC crosswalk (as described in Section 2.1.2) and calculated the median of the average monthly concentrations (hereafter referred to as the median concentration) for each pollutant discharged by facilities in each PSC. EPA narrowed the scope of this analysis using the following assumptions:

- EPA excluded pollutants that were only reported by one facility within a PSC from this analysis because they are unlikely to be representative of discharges within a PSC.
- EPA only ranked PSCs where median concentrations were greater than 0 mg/L to focus its review on top-ranking discharges.
- EPA removed pollutants reported by only one PSC because the analysis is intended to provide a comparison of discharge concentrations across PSCs.

As an example, EPA presents the cross-category concentration analysis for pollutant discharges associated with Sugar Processing (40 CFR Part 409). This PSC has discharge concentration data for 34 pollutants; 22 are reported by only one facility and are excluded from further analysis. Table 2 presents the median concentration for all the pollutants included in the analysis for the Sugar Processing PSC.

Table 2. Median Concentrations of Pollutants Reported by Facilities in the Sugar Processing PSC

Pollutant[a]	Median Concentration[b]	Units of Median Concentration	Number of Facilities Reporting Pollutant
Ammonia as N	3.62	mg/L	11
Bicarbonate ion (as HCO_3)	498	mg/L	2
Chloride	88.0	mg/L	2
Copper	23.9	µg/L	2
Lead	4.46	µg/L	2
Magnesium	42.6	mg/L	2
Mercury	0.138	µg/L	2

Table 2. Median Concentrations of Pollutants Reported by Facilities in the Sugar Processing PSC

Pollutant[a]	Median Concentration[b]	Units of Median Concentration	Number of Facilities Reporting Pollutant
Nitrogen	12.4	mg/L	3
Phosphorus	0.591	mg/L	12
Sodium	159	mg/L	2
Total Kjeldahl Nitrogen	12.3	mg/L	2
Total Residual Chlorine	42.2	µg/L	2

a – This list excludes the following pollutants: aldicarb, arsenic, base neutrals and acid, boron, cadmium, chlorodibromomethane, chloropyrifos, cyanide, di(2-ethylhexyl) phthalate, total hardness, inorganic nitrogen, iron, manganese, nickel, potassium, selenium, silver, sulfate, undissociated hydrogen sulfide, 2,3,7,8-tetrachlorodibenzodioxin equivalents, volatile organic compounds, and zinc.
b – EPA rounded the median concentration to three significant figures.

Step 2: Identify PSCs with Highest Median Concentrations by Pollutant

For each of the pollutants included in the analysis from Step 1, EPA sorted the median pollutant concentrations for the PSCs from highest to lowest and assigned the PSC a rank.

For example, 51 PSCs reported ammonia as N. Table 3 presents the top 15 PSCs sorted from highest to lowest median concentration for ammonia as N and the corresponding EPA-assigned rank.

Table 3. PSCs Sorted by Median Ammonia as N Concentration[a]

PSC Rank by Median Concentration of Ammonia as N	PSC Name	Median Ammonia as N Concentration (mg/L)[b]
1	Explosives Manufacturing	13.0
2	Centralized Waste Treatment	6.71
3	Electrical and Electronic Components	5.93
4	Canned and Preserved Seafood Processing	4.61
5	Sugar Processing	3.62
6	Waste Combustors	2.91
7	Fertilizer Manufacturing	1.96
8	Soap And Detergent Manufacturing	1.25
9	Oil & Gas Extraction	0.969
10	Grain Mills	0.923
11	Inorganic Chemicals Manufacturing	0.880
12	Pulp, Paper and Paperboard	0.856
13	Unassigned Waste Facility	0.841
14	Textile Mills	0.823
15	Landfills	0.788

a – This is not the complete list of the PSCs reporting ammonia as N.
b – EPA rounded the median concentration to three significant figures.

Step 3: Calculate PSC Scores

For the 2020 cross-category concentration analysis, EPA used two approaches to assess the relative number of top-ranking pollutants within a PSC and from the results, developed a PSC score for each approach.

- *Top Five PSC Approach*: Counts the number and percent of pollutants where the median concentration for the PSC was among the five highest median concentrations for the pollutant across all PSCs (see Step 3a below).
- *Top 25 Percent PSC Approach:* Counts the number and percent of pollutants where the median concentration for the PSC was among the top 25 percent of highest median concentrations for the pollutant across all PSCs (see Step 3b below).

In its prior 2019 cross-category concentration analysis (U.S. EPA, 2020), EPA ranked PSCs using only the *Top Five PSC Approach*. Including the *Top 25 Percent Approach* in the 2020 rankings analysis allowed EPA to consider and better account for PSCs with unique pollutants that are reported by very few categories, which may be overweighted in the *Top Five PSC Approach*.

To normalize for the varying number of pollutants reported by each PSC, for each approach EPA divided the count of top-ranking pollutants by the total number of pollutants reported by more than one facility in the PSC. This provided a directly comparable "score" for each PSC representing the percent of pollutants in the PSC with median concentrations ranked higher across PSCs.

Step 3a: Calculating a PSC Score Using the Top Five PSC Approach

For each PSC, EPA counted the number of pollutants where the median concentration for the PSC ranked among the five highest median concentrations for the pollutant across all PSCs (from Step 2). EPA then divided the count of top-ranking pollutants by the total number of pollutants reported by more than one facility in the PSC to calculate the overall score (the percent of top-ranking pollutants) for the PSC.

Using the Sugar Processing Category to illustrate this approach, the median pollutant concentrations ranked among the top five across PSCs for seven of the 12 pollutants (58 percent) reported by the facilities in the PSC, as shown in Table 4. This percentage becomes the PSC score for this approach.

Table 4. Top Five Pollutant Rank for the Sugar Processing PSC

Pollutant Name	Median Concentration[a]	Median Sugar Processing Concentration Rank Compared to Other PSCs
Mercury	0.138 µg/L	1 of 28
Bicarbonate ion (as HCO_3)	498 mg/L	2 of 5
Sodium	159 mg/L	3 of 10
Total Kjeldahl Nitrogen	12.3 mg/L	4 of 36
Ammonia as N	3.62 mg/L	5 of 51
Copper	23.9 µg/L	5 of 44
Lead	4.46 µg/L	5 of 30
Magnesium	42.6 mg/L	6 of 11
Total Residual Chlorine	0.0422 mg/L	7 of 32
Nitrogen	12.4 mg/L	11 of 36
Phosphorus	0.591 mg/L	16 of 47
Chloride	88.0 mg/L	21 of 35

a – EPA rounded the median concentration to three significant figures.

Step 3b: Calculating a PSC Score Using the Top 25 Percent PSC Approach

For each pollutant, EPA identified PSCs with median concentrations that ranked among the top 25 percent for the pollutant across PSCs, using the following equation:

Top 25 Percent = Round Up [Total Number of PSCs Reporting Pollutant x 0.25] [9]

For example, 51 PSCs reported ammonia as N; therefore, EPA counted the top 13 PSCs with the highest median ammonia as N concentration.

For each PSC, EPA counted the number of pollutants where the PSC ranked among the top 25 percent of median concentrations across PSCs. EPA then divided the count of top-ranking pollutants by the total number of pollutants reported by more than one facility in the PSC to calculate the overall score (the percent of top-ranking pollutants) for the PSC.

Continuing to use the Sugar Processing Category to illustrate this approach, the median pollutant concentrations ranked among the top 25 percent of PSCs for eight of the 12 pollutants (67 percent) reported by the facilities in the PSC, as shown in Table 5. This percentage becomes the PSC's score.

Table 5. Top 25 Percent Pollutant Rank for the Sugar Processing PSC

Pollutant Name	Number of PSCs Comprising Top 25 Percent of Median Concentrations[a]	Median Sugar Processing Concentration Rank Compared to Other PSCs
Mercury	7	1 of 28
Bicarbonate ion (as HCO_3)	2	2 of 5
Sodium	3	3 of 10
Total Kjeldahl Nitrogen	9	4 of 36
Ammonia as N	13	5 of 51
Copper	11	5 of 44
Lead	8	5 of 30
Total Residual Chlorine	8	7 of 32
Magnesium	3	6 of 11
Nitrogen	9	11 of 36
Phosphorus	12	16 of 47
Chloride	9	21 of 35

a – EPA used the following formula to calculate this value: Top 25 Percent = Round Up[Total Number of PSCs Reporting Pollutant x 0.25].

Step 4: Rank and Prioritize PSCs for Further Review

EPA ranked the PSCs by the scores generated from both the *Top Five PSC Approach* and the *Top 25 Percent PSC Approach* (identified in Step 3). EPA selected the top five ranking PSCs from each approach for further consideration for a preliminary category review, excluding any PSCs currently being reviewed as identified in Effluent Guidelines Program Plan 14. Section 3 (Table 6) presents the results of the cross-category concentration analysis for both approaches.

2.2.3 Cross-Category Concentration Analysis Limitations

EPA identified several limitations of the cross-category concentration analysis, which include, but are not limited to the following.

- Analysis is relative to what other categories are reporting and does not consider the extent of discharge. A PSC that discharges larger concentrations relative to other categories may or may not indicate the potential for reducing or eliminating pollutant discharges within that PSC.

[9] EPA rounded up to the next whole number to ensure a minimum of one PSC was considered for each pollutant.

- Analysis uses median concentration and does not directly account for the range of concentration data within a PSC.
- Analysis does not compare the median pollutant concentrations for a PSC to any national effluent limitations, if there is one, or to specific permit limits.
- Analysis does not consider the magnitude (i.e., pollutant loading) or toxicity of the pollutants being discharged.
- Analysis may rank higher those PSCs whose facilities monitor and report pollutants unique to the PSC simply because few other PSCs report those pollutants; though also considering categories that rank high using the *Top 25 Percent PSC Approach* addresses this limitation to some extent.

Even with these limitations, EPA considered the cross-category concentration analysis an appropriate method to provide a screening-level review of industrial discharges, as it provided an indication of the extent to which a PSC has larger concentrations of pollutant discharges relative to other PSCs. This analysis considered all DMR data reported as concentration and quantity simultaneously, including facilities with monitoring requirements only. The cross-category concentration analysis was a starting point for prioritizing PSCs for further review. To the extent possible, EPA addressed the limitations associated with the analysis as part of the review of prioritized PSCs, which included a review of the range and magnitude of concentrations and comparison to national standards and treatment performance data.

3. Results of the Cross-Category Concentration Analysis

Table 6 presents the results of this analysis, including the following information for each PSC. Though the table presents results from the *Top Five PSC Approach* and *Top 25 Percent PSC Approach*, it is sorted from highest to lowest score from the *Top Five PSC Approach* (and then alphabetically for PSCs with the same score).

- *Top Five PSC Approach PSC Score (Column A)*. Percent of pollutants reported by more than one facility where the PSC's median concentration ranked among the top five highest median concentrations reported for the pollutant across all PSCs. Value is calculated from the number of pollutants that rank in the top five (Column B) and the number of pollutants with data reported (Column E).
- *Top Five PSC Approach Number of Top-Ranking Pollutants (Column B)*. Number of pollutants reported by more than one facility where the PSC's median concentration ranked among the top five highest median concentrations reported for the pollutant across all PSCs.
- *Top 25 Percent PSC Approach PSC Score (Column C)*. Percent of pollutants reported by more than one facility where the PSC's median concentration ranked among the top 25 percent highest median concentrations reported for the pollutant across all PSCs. Value is calculated from the number of pollutants that rank in the top 25 percent (Column D) and the number of pollutants with data reported (Column E).
- *Top 25 Percent PSC Approach Top-Ranking Pollutants (Column D).* Number of pollutants reported by more than one facility where the PSC's median concentration ranked among the top 25 percent highest median concentrations reported for the pollutant across all PSCs.
- *Number of Pollutants with Data Reported (Column E).* Number of pollutants that were reported by more than one facility within a PSC and a discharge concentration of greater than zero, and therefore, considered in the cross-category concentration analysis for the PSC.
- *Number of Facilities Reporting Data (Column F).* Total number of facilities reporting data for any pollutant within the PSC (including pollutants that were reported by only one facility).

EPA excluded from further consideration categories currently under review (U.S. EPA, 2021). For the remaining categories, EPA identified the five PSCs with the highest scores from both the *Top Five PSC Approach* (highlighted in blue in Table 6) and *Top 25 Percent PSC Approach* (highlighted in green in Table 6) for further review. Three of the top PSCs overlapped between the two analyses, therefore EPA selected for further review seven total PSCs, which included:

- Canned and Preserved Seafood Processing (40 CFR Part 408)
- Sugar Processing (40 CFR Part 409)
- Soap and Detergent Manufacturing (40 CFR Part 417)
- Metal Products and Machinery (40 CFR Part 438)
- Paint Formulating (40 CFR Part 446)
- Explosives Manufacturing (40 CFR Part 457)
- Battery Manufacturing (40 CFR Part 461)

Table 6. Cross-Category Concentration Analysis Results

		Top Five PSC Approach		Top 25 Percent PSC Approach			
		PSC Score (Percent of Top- Ranking Pollutants)	Number of Top-Ranking Pollutants	PSC Score (Percent of Top-Ranking Pollutants)	Number of Top-Ranking Pollutants	Number of Pollutants with Data Reported	Number of Facilities Reporting Data
40 CFR Part	PSC Name	A	B	C	D	E	F
469	Electrical and Electronic Components[a]	100.0%	3	100.0%	3	3	5
461	Battery Manufacturing	100.0%	1	100.0%	1	1	2
438	Metal Products and Machinery	100.0%	11	0.0%	0	11	63
457	Explosives Manufacturing	80.0%	4	80.0%	4	5	6
408	Canned and Preserved Seafood Processing	66.7%	6	77.8%	7	9	27
417	Soap and Detergent Manufacturing	63.3%	19	20.0%	6	30	11
429	Timber Products Processing	60.5%	23	28.9%	11	38	54
409	Sugar Processing	58.3%	7	66.7%	8	12	15
455	Pesticide Chemicals	55.6%	5	55.6%	5	9	15
414	Organic Chemicals, Plastics and Synthetic Fibers	51.6%	32	24.2%	15	62	296
437	Centralized Waste Treatment[a]	50.0%	14	32.1%	9	28	7
446	Paint Formulating	50.0%	2	75.0%	3	4	6
443	Paving and Roofing Materials (Tars and Asphalt)	50.0%	8	50.0%	8	16	37
420	Iron and Steel Manufacturing	44.7%	21	38.3%	18	47	100
432	Meat and Poultry Products[a]	43.3%	13	40.0%	12	30	185
415	Inorganic Chemicals Manufacturing	40.5%	17	38.1%	16	42	112
467	Aluminum Forming	40.0%	4	40.0%	4	10	10
N/A	Food Service Establishments	40.0%	2	40.0%	2	5	107
433	Metal Finishing	40.0%	18	26.7%	12	45	357
439	Pharmaceutical Manufacturing	37.5%	9	37.5%	9	24	32
430	Pulp, Paper and Paperboard	37.1%	13	40.0%	14	35	145
421	Nonferrous Metals Manufacturing	37.0%	10	40.7%	11	27	36
426	Glass Manufacturing	36.8%	7	42.1%	8	19	23
442	Transportation Equipment Cleaning	36.4%	8	18.2%	4	22	39

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Table 6. Cross-Category Concentration Analysis Results

40 CFR Part	PSC Name	Top Five PSC Approach		Top 25 Percent PSC Approach		Number of Pollutants with Data Reported	Number of Facilities Reporting Data
		PSC Score (Percent of Top- Ranking Pollutants)	Number of Top-Ranking Pollutants	PSC Score (Percent of Top-Ranking Pollutants)	Number of Top-Ranking Pollutants		
		A	B	C	D	E	F
423	Steam Electric Power Generating[a]	36.0%	18	10.0%	5	50	442
445	Landfills	34.1%	14	19.5%	8	41	143
N/A	Independent and Stand Alone Labs	33.3%	4	25.0%	3	12	14
435	Oil and Gas Extraction[a]	33.3%	9	29.6%	8	27	76
449	Airport Deicing	31.3%	5	37.5%	6	16	44
436	Mineral Mining and Processing	31.3%	10	18.8%	6	32	217
471	Nonferrous Metals Forming and Metal Powders	30.4%	7	56.5%	13	23	33
405	Dairy Products Processing	30.0%	6	30.0%	6	20	77
418	Fertilizer Manufacturing	27.8%	5	33.3%	6	18	35
N/A	Drinking Water Treatment	27.8%	10	22.2%	8	36	1425
N/A	Unassigned Waste Facility	27.5%	11	17.5%	7	40	115
460	Hospital	26.7%	4	33.3%	5	15	140
468	Copper Forming	25.0%	1	50.0%	2	4	5
424	Ferroalloy Manufacturing	23.8%	5	23.8%	5	21	9
440	Ore Mining and Dressing	23.3%	7	10.0%	3	30	72
419	Petroleum Refining	21.9%	7	15.6%	5	32	331
434	Coal Mining	20.5%	8	10.3%	4	39	1700
412	Concentrated Animal Feed Operations	20.0%	1	40.0%	2	5	16
450	Construction and Development	20.0%	4	25.0%	5	20	49
464	Metal Molding and Casting (Foundries)	20.0%	3	40.0%	6	15	29
407	Canned and Preserved Fruits and Vegetables Processing	18.8%	3	25.0%	4	16	56
444	Waste Combustors	13.3%	2	33.3%	5	15	11
451	Concentrated Aquatic Animal Production	12.5%	2	0.0%	0	16	193

Table 6. Cross-Category Concentration Analysis Results

40 CFR Part	PSC Name	Top Five PSC Approach: PSC Score (Percent of Top- Ranking Pollutants)	Top Five PSC Approach: Number of Top-Ranking Pollutants	Top 25 Percent PSC Approach: PSC Score (Percent of Top-Ranking Pollutants)	Top 25 Percent PSC Approach: Number of Top-Ranking Pollutants	Number of Pollutants with Data Reported	Number of Facilities Reporting Data
		A	B	C	D	E	F
463	Plastics Molding and Forming	12.5%	2	31.3%	5	16	31
428	Rubber Manufacturing	11.8%	2	11.8%	2	17	43
N/A	Miscellaneous Foods and Beverages	10.7%	3	0.0%	0	28	82
406	Grain Mills	9.1%	1	63.6%	7	11	26
410	Textile Mills[a]	8.3%	1	50.0%	6	12	31
411	Cement Manufacturing	4.3%	1	4.3%	1	23	48
422	Phosphate Manufacturing	0.0%	0	12.5%	1	8	14
N/A	Printing and Publishing	0.0%	0	0.0%	0	1	2

Source: ERG, 2020a.

N/A: Not Applicable

a – EPA is conducting other efforts on these categories, and they were not further reviewed in this content.

Note: Top PSCs identified through the Top Five Approach are highlighted in blue, and top PSCs identified through the Top 25 Percent Approach are highlighted in green. PSCs not included in this review due to only one facility reporting a pollutant: Coil Coating, Gum and Wood Chemicals Manufacturing, Industrial Laundries, Leather Tanning and Finishing, Tobacco Products, Carbon Black Manufacturing, Ink Formulating, Asbestos Manufacturing.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Preliminary Effluent Guidelines Program Plan 15 86 Fed. Reg. 51,155 (Sept. 14, 2021)	Docket ID No. EPA-HQ-OW-2021-0547

COMMENTS OF ENVIRONMENTAL INTEGRITY PROJECT AND 61 ORGANIZATIONS REGARDING THE U.S. ENVIRONMENTAL PROTECTION AGENCY'S ANNUAL REVIEW AND REVISION PROCESS FOR EFFLUENT LIMITATION GUIDELINES

Submitted electronically: *www.regulations.gov*

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INTRODUCTION

On September 22, 2021, the Environmental Integrity Project and 61 other organizations sent the attached letter to Administrator Michael Regan to respectfully request that the U.S. Environmental Protection Agency ("EPA") prioritize the Effluent Limitation Guidelines program and reconsider its approach to reviewing and revising these national water pollution limits for industries. Our organizations are comprised of national and regional environmental and conservation groups as well as national, regional, and local waterkeepers. As discussed in our letter, the upcoming fiftieth anniversary of the landmark 1972 Clean Water Act presents an opportunity for EPA to revitalize its Effluent Limitation Guidelines program, an important tool mandated by Congress to help meet the Clean Water Act's ultimate goal of eliminating water pollution. Given that EPA is soliciting comments on its reviews of industrial wastewater discharges through Preliminary Effluent Guidelines Program Plan 15, we are submitting this letter as comments for the Agency's consideration.

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September 22, 2021

The Honorable Michael Regan
Administrator
U.S. Environmental Protection Agency
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Mail code 1101A
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Sent via certified mail & electronic mail.

Re: EPA's Annual Review of Effluent Limitation Guidelines Under the Clean Water Act

Dear Administrator Regan,

Next year marks the fiftieth anniversary of the 1972 Clean Water Act. The Act established certain national goals, including an interim goal to achieve water quality levels that are "fishable and swimmable," and the ultimate goal to eliminate water pollution in order to restore and maintain the chemical, physical, and biological integrity of the nation's waters. Congress gave EPA broad new regulatory and enforcement powers to achieve those ambitious objectives, such as the responsibility to develop increasingly stringent pollution limits for industries that send large quantities of pollution into our nation's waterways (known as effluent limitation guidelines or "ELGs"). Despite some progress, 60% of the rivers and stream miles that have been assessed fail to meet water quality standards because they are impaired by pollutants—which means that fewer than half of the country's assessed waterways are reliably safe and clean.[1] While we applaud EPA's recent determination that the ELGs for three industries warrant revision,[2] the fact remains that the Agency is not carrying out its annual review and revise duties as required by Congress. As we approach a landmark anniversary of the Clean Water Act, we write to voice our concerns over EPA's stagnant process for revising these national water pollution limits.

The Clean Water Act charged EPA with establishing pollution limits based on the best available treatment methods, and then reviewing these limits annually to keep pace with advances in technologies to reduce—and ultimately eliminate—water pollution from industrial sources. In the 1970s and 1980s, EPA began to meet that obligation head on. During those two decades,

[1] Data taken from EPA, National Water Quality Inventory: Report to Congress (Aug. 2017) [hereinafter "EPA Report to Congress"], at 8, 11, 18, *available at* https://www.epa.gov/sites/default/files/2017-12/documents/305brtc_finalowow_08302017.pdf.

[2] On September 14, 2021, EPA announced its determination that revision of the following ELGs or pretreatment standards are warranted: (1) Meat and Poultry Products Category to address nutrient discharges; (2) Organic Chemicals, Plastics, & Synthetic Fibers Category to address Per- and Polyfluoroalkyl Substances ("PFAS") discharges; and (3) Metal Finishing Category to address PFAS discharges. Preliminary Effluent Guidelines Program Plan 15, 86 Fed. Reg. 51,155 (Sept. 14, 2021), *available at* https://www.govinfo.gov/content/pkg/FR-2021-09-14/pdf/2021-19787.pdf.

EPA promulgated national water pollution limits for 50 out of the 59 industries currently subject to such limits.[3] But since then, EPA has failed to lower these limits as new, more effective treatment methods become available, which is one of the reasons so many rivers, streams, and estuaries are so far from achieving the goals promised by the Clean Water Act.

The table attached to this letter identifies when EPA first created and last revised the national water pollution limits for each industry and why the revisions were made. EPA has an annual duty to revise these existing limits, if appropriate.[4] Under the Clean Water Act, revision is appropriate if the existing limits no longer reflect the degree of pollution reduction achievable through the application of appropriately advanced technology.[5] Nevertheless, limits for 39 of the 59 industries were last updated more than 30 years ago, and 17 of those date back to the 1970s.

In fact, the average age of these national water pollution limits is 31 years old. To provide context, the World Wide Web was first launched 31 years ago. In 1990, Apple was still 11 years away from releasing the iPod and 17 years away from its first public release of the iPhone. And at that time, facilities filled out discharge monitoring reports by hand and submitted them by mail. Fast-forward to the present, the internet is now widely accessible through cell phones, Apple just introduced the thirteenth generation of the iPhone, and facilities submit their discharge monitoring reports electronically—allowing for quicker, more accurate pollution reporting with less labor.

Yet, today some of the biggest industrial sources of water pollution operate under national limits that were written more than 30 years ago, including:

- Ferroalloy Manufacturing (last revised 1975)
- Cement Manufacturing (last revised 1977)
- Carbon Black Manufacturing (last revised 1978)
- Petroleum Refining (last revised 1985)

Given that the Clean Water Act charged EPA with reviewing these limits annually to keep pace with advances in technology, it is clear EPA's review process is fundamentally flawed. To illustrate, EPA commenced a detailed study in 2014 into the national water pollution limits for the Petroleum Refining industry, which were last revised in 1985. In 2019, the Agency concluded this five-year study by deciding not to revise the limits for refineries,[6] a decision that EPA reaffirmed earlier this year.[7] However, EPA admitted in its Response to Comments that "the current review did not evaluate whether the existing Refinery ELGs continue to represent

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[3] For the other nine industries, EPA created national limits for seven in the 2000s and two in the 2010s.

[4] 33 U.S.C. § 1314(b).

[5] *Id.*

[6] EPA, Preliminary Plan 14 (Oct. 24, 2019) at 4-1 ("Based on the data gathered during the study, the EPA is concluding the study and not taking further action at this time.").

[7] EPA, Final Plan 14 (Jan. 6, 2021) at 6-1 ("EPA is concluding its detailed study of wastewater discharges from the petroleum industry (40 CFR 419) and is not taking further action on this source category at this time.").

[Best Available Technology]," as the Clean Water Act requires.[8] EPA's failure, over the course of a multi-year review, to consider the very question that would establish the necessity of updating these limits, demonstrates the complete breakdown of EPA's existing review process. Meanwhile, according to the limited data available from the Toxics Release Inventory, discharges of nitrate compounds to surface waters from refineries tripled between 1996 and 2019.

We respectfully request that EPA prioritize the ELG program, given its effectiveness in reducing water pollution across the country, and reconsider its approach to reviewing and revising these national limits for industries, as the current pace is far too slow to keep up with even the most obvious improvements in wastewater treatment methods. To start, EPA's regular review process should examine whether existing limits currently reflect the degree of pollution reduction achievable through today's modern technology. In addition, we recommend that EPA apply the data and information the Agency has already obtained regarding current technology when reviewing recurring wastewater treatment issues that are common to multiple industries. EPA has found that more than 40% of our rivers and streams are impaired by nutrients,[9] which include nitrogen compounds such as nitrates. The Agency has known for several decades that wastewater systems installed to remove ammonia will generate nitrates as a byproduct that, like ammonia, will feed algae growth and depress oxygen levels. To meet the goals of the Chesapeake Bay cleanup plan, states have already required industrial sources in the watershed to install "denitrification systems" that have successfully reduced nitrate discharges. As denitrification systems are already broadly available and in operation at industrial plants, EPA could apply its knowledge about this "best available technology" when reviewing national limits for refineries and other industrial categories—ultimately allowing the Agency to eliminate tens of millions of pounds of nitrates and help to heal waterways that are now choked with algae or starved of oxygen. Such stream-lined approaches would also allow EPA to satisfy its Clean Water Act obligations as Congress intended.

As it stands, EPA simply cannot fulfill its mandate of setting increasingly protective, technology-based pollution limits for any industrial sources if it does not regularly review whether existing limits reflect best available technology. EPA's current review process is not only hindering the Agency from cleaning up some of the most obvious sources of water pollution but also preventing the country from restoring its waterways, as promised by the Clean Water Act nearly fifty years ago.

We would welcome the opportunity to meet with you to discuss our concerns and recommendations. In the meantime, thank you for considering our views.

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[8] EPA, Comment Response Document for Preliminary Plan 14 (Dec. 2020) at 77.

[9] EPA 2017 Report to Congress, *supra* note 1, at 7.

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Table. EPA's Water Pollution Limits for Industries, Sorted from Oldest to Newest[10]

ELG (Industrial Category)	40 CFR Part	Year of Promulgation	Year of Last Revision	Age of ELG (Years)	If Applicable, Reason for Revision
Rubber Manufacturing	428	1974	never revised	47	
Asbestos Manufacturing	427	1974	1975	46	Added pretreatment standards.
Canned and Preserved Seafood (Seafood Processing)	408	1974	1975	46	Added pretreatment standards.
Dairy Products Processing[11]	405	1974	1975	46	Added pretreatment standards.
Ferroalloy Manufacturing[12]	424	1974	1975	46	Added more subparts.
Soap and Detergent Manufacturing	417	1974	1975	46	Added pretreatment standards.
Ink Formulating	447	1975	never revised	46	
Paint Formulating	446	1975	never revised	46	
Paving and Roofing Materials (Tars and Asphault)	443	1975	never revised	46	
Canned and Preserved Fruits and Vegetable Processing	407	1974	1976	45	Revoking certain limitations after D.C. Cir. found that industry did not have sufficient opportunity to comment.

[10] EPA, Industrial Effluent Guidelines (last accessed Aug. 18, 2021) [hereinafter "EPA's ELG Chart"], *available at* https://www.epa.gov/eg/industrial-effluent-guidelines.

[11] EPA's ELG Chart lists the year of last revision as 1974; however, EPA last revised some aspect of this industrial category in 1975. *See* Dairy Processing Point Source Category, 40 Fed. Reg. 6,432 (Feb. 11, 1975), *available at* https://www.epa.gov/sites/default/files/2018-08/documents/dairy-products_final_02-11-1975_40-fr-6432.pdf.

[12] EPA's ELG Chart lists the year of last revision as 1974; however, EPA last revised some aspect of this industrial category in 1975. *See* Ferroalloy Manufacturing Point Source Category, 40 Fed. Reg. 8,030 (Feb. 24, 1975), *available at* https://www.epa.gov/sites/default/files/2016-09/documents/ferroalloy-mfg_int-final_subpts_d-g_40-fr-8030_02-24-1975.pdf.

ELG (Industrial Category)	40 CFR Part	Year of Promulgation	Year of Last Revision	Age of ELG (Years)	If Applicable, Reason for Revision
Explosives Manufacturing	457	1976	never revised	45	
Gum and Wood Chemicals	454	1976	never revised	45	
Hospitals	460	1976	never revised	45	
Photographic	459	1976	never revised	45	
Cement Manufacturing[13]	411	1974	1977	44	Amendment proposed and received comments from industry in support.
Carbon Black Manufacturing	458	1976	1978	43	Amendments as a result of petitions filed with 5th Cir. and using monitoring information from EPA Region VI and submitted by the companies that petitioned.
Mineral Mining and Processing	436	1975	1979	42	Revoked portions of the regulation after the 4th Cir. invalidated them.
Timber Products Processing	429	1974	1981	40	Revisions prompted by settlement agreement with NRDC.
Textile Mills	410	1974	1982	39	Revisions prompted by settlement agreement with NRDC.
Inorganic Chemicals	415	1982	never revised	39	

[13] EPA's ELG Chart lists the year of last revision as 1974; however, EPA last revised some aspect of this industrial category in 1977. *See* Cement Manufacturing Point Source Category, 42 Fed. Reg. 10,681 (Feb. 23, 1977), *available at* https://www.epa.gov/sites/default/files/2018-07/documents/cement-mfg_final_02-23-1977_42-fr-10681.pdf.

ELG (Industrial Category)	40 CFR Part	Year of Promulgation	Year of Last Revision	Age of ELG (Years)	If Applicable, Reason for Revision
Electroplating	413	1974	1983	38	Revisions prompted by settlement agreement with NRDC.
Coil Coating	465	1982	1983	38	Revisions prompted by settlement agreement with NRDC.
Electrical and Electronic Components	469	1983	never revised	38	Promulgated in response to settlement agreement in NRDC v. Train.
Plastics Molding and Forming	463	1984	never revised	37	
Petroleum Refining[14]	419	1974	1985	36	Revisions prompted by settlement agreement with NRDC.
Porcelain Enameling	466	1982	1985	36	Revisions in response to settlement agreement with members of the porcelain enamel industry.
Metal Molding and Casting (Foundries)	464	1985	never revised	36	
Glass Manufacturing[15]	426	1974	1986	35	Amended to comply with new Best Conventional Pollutant Control Technology ("BCT") guidelines following judicial challenge.
Grain Mills[16]	406	1974	1986	35	Amended to comply with new BCT guidelines following judicial challenge.

[14] EPA's ELG Chart lists the year of last revision as 1982; however, EPA last revised some aspect of this industrial category in 1985. *See* Petroleum Refining Point Source Category, 50 Fed. Reg. 32,414 (Aug. 12, 1977), *available at* https://www.epa.gov/sites/default/files/2015-09/documents/petro-refining_settlement_correction_50-fr-32414_08-12-1985.pdf.

[15] EPA's ELG Chart lists the year of last revision as 1975; however, EPA last revised some aspect of this industrial category in 1986. *See* Best Conventional Pollutant Control Technology; Effluent Limitations Guidelines, 51 Fed. Reg. 24,974 (July 9, 1986), *available at* https://www.epa.gov/sites/default/files/2018-11/documents/effluent-guidelines-bct_final_51-fr-24974_07-09-1986.pdf.

[16] EPA's ELG Chart lists the year of last revision as 1974; however, EPA last revised some aspect of this industrial category in 1986. *See id.*

ELG (Industrial Category)	40 CFR Part	Year of Promulgation	Year of Last Revision	Age of ELG (Years)	If Applicable, Reason for Revision
Phosphate Manufacturing[17]	422	1974	1986	35	Amended to comply with new BCT guidelines following judicial challenge.
Sugar Processing[18]	409	1974	1986	35	Amended to comply with new BCT guidelines following judicial challenge.
Copper Forming	468	1983	1986	35	Amendments pursuant to settlement agreement with regulated entity.
Metal Finishing	433	1983	1986 (pending)	35	The changes in 1986 were only "grammatical clarification[s]" and corrected errors in the list of regulated toxic organic pollutants.
Battery Manufacturing	461	1984	1986	35	Revisions pursuant to settlement agreement with regulated entity.
Fertilizer Manufacturing[19]	418	1974	1986	35	In response to petitions from industry.
Ore Mining and Dressing (Hard Rock Mining)	440	1975	1988	33	In response to Consent Decree with Trustees for Alaska.
Aluminum Forming	467	1983	1988	33	Settlement agreement to resolve a lawsuit challenging the original regulations of 1983 (with regulated entities).
Nonferrous Metals Forming	471	1985	1989	32	In response to settlement agreement with regulated entity.

[17] EPA's ELG Chart lists the year of last revision as 1974; however, EPA last revised some aspect of this industrial category in 1986. *See id.*

[18] EPA's ELG Chart lists the year of last revision as 1984; however, EPA last revised some aspect of this industrial category in 1986. *See id.*

[19] EPA's ELG Chart lists the year of last revision as 1975; however, EPA last revised some aspect of this industrial category in 1986. *See id.*

ELG (Industrial Category)	40 CFR Part	Year of Promulgation	Year of Last Revision	Age of ELG (Years)	If Applicable, Reason for Revision
and Metal Powders					
Nonferrous Metals Manufacturing	421	1976	1990	31	In response to multiple settlement agreements (with regulated entities).
Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF)	414	1987	1993 (pending)	28	1993 Amendments respond to Fifth Cir.'s decisions.
Leather Tanning and Finishing	425	1982	1996	25	In response to "a petition submitted by the leather tanning industry."
Pesticide Chemicals[20]	455	1978	1998	23	Revisions to analytical methods made to "introduce greater flexibility in the use of approved [testing] methods."
Landfills	445	2000	never revised	21	Never revised, but established pursuant to settlement agreement with NRDC.
Transportation Equipment Cleaning	442	2000	never revised	21	
Waste Combustors	444	2000	never revised	21	Never revised, but established pursuant to settlement agreement with NRDC.

[20] EPA's ELG Chart lists the year of last revision as 1996; however, EPA last revised some aspect of this industrial category in 1998. *See* Amendments to the Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards for the Organic Pesticide Chemicals Manufacturing Industry, 63 Fed. Reg. 39,440 (July 22, 1998), *available at* https://www.federalregister.gov/documents/1998/07/22/98-19514/amendments-to-the-effluent-limitations-guidelines-pretreatment-standards-and-new-source-performance.

ELG (Industrial Category)	40 CFR Part	Year of Promulgation	Year of Last Revision	Age of ELG (Years)	If Applicable, Reason for Revision
Centralized Waste Treatment	437	2000	pending	21	Following Detailed Study (released 2018), stakeholders expressed concern regarding discharge options.
Coal Mining	434	1975	2002	19	Amendment to regulations to create consistency with Rahall Amendment.
Pharmaceutical Manufacturing	439	1976	2003	18	Following 1998 amendments, "received comments from the regulated community and after [EPA's] own analysis and review, [EPA] determined that several minor amendments which are discussed below were warranted."
Metal Products and Machinery	438	2003	never revised	18	
Meat and Poultry Products	432	1974	2004 (pending)	17	Revisions prompted by settlement agreement with NRDC.
Concentrated Aquatic Animal Production	451	2004	never revised	17	Promulgations required by June 30, 2004 under consent decree with NRDC.
Iron and Steel Manufacturing	420	1974	2005	16	Revisions proposed after concern expressed by steel mill representatives.
Pulp, Paper, and Paperboard[21]	430	1974	2007	14	Revisions to "introduce greater flexibility in the use of approved [testing] methods."

[21] EPA's ELG Chart lists the year of last revision as 2002; however, EPA last revised some aspect of this industrial category in 2007. *See* Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act, 72 Fed. Reg. 11,200 (Mar. 12, 2007), *available at* https://www.govinfo.gov/content/pkg/FR-2007-03-12/pdf/07-1073.pdf.

ELG (Industrial Category)	40 CFR Part	Year of Promulgation	Year of Last Revision	Age of ELG (Years)	If Applicable, Reason for Revision
Concentrated Animal Feeding Operations (CAFO)	412	1974	2008	13	In response to order from 2d Cir.
Airport Deicing	449	2012	never revised	9	
Construction and Development	450	2009	2014	7	Guidelines first promulgated as result of permanent injunction. Amendments result of settlement agreement with regulated entity.
Oil and Gas Extraction	435	1975	2016	5	Revision meant to "[fill] a gap in existing federal wastewater regulations to ensure that the current industry practice of not sending wastewater discharges form this sector to POTWs continues into the future."
Dental Offices	441	2017	never revised	4	Never revised, but promulgated because the US joined an international agreement, the Minamata Convention on Mercury, addressing widespread mercury pollution. Also, corrections were made to the regulation the same year.
Steam Electric Power Generating	423	1974	2020 (pending)	1	EPA has initiated a rulemaking to strengthen certain discharge limits.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Preliminary Effluent Guidelines Program Plan 15 86 Fed. Reg. 51,155 (Sept. 14, 2021)	Docket ID No. EPA-HQ-OW-2021-0547

COMMENTS OF ENVIRONMENTAL INTEGRITY PROJECT, AIR ALLIANCE HOUSTON, BAYOU CITY WATERKEEPER, CENTER FOR BIOLOGICAL DIVERSITY, CHESAPEAKE CLIMATE ACTION NETWORK, CLEAN AIR COUNCIL, COASTAL ALLIANCE TO PROTECT OUR ENVIRONMENT, ENVIRONMENT AMERICA, ENVIRONMENT TEXAS, HEALTHY GULF, HOOSIER ENVIRONMENTAL COUNCIL, INDIGENOUS PEOPLES OF THE COASTAL BEND, LOUISIANA BUCKET BRIGADE, PENNENVIRONMENT, PORT ARTHUR COMMUNITY ACTION NETWORK, SIERRA CLUB, TEXAS CAMPAIGN FOR THE ENVIRONMENT, U.S. PUBLIC INTEREST RESEARCH GROUP, WATERKEEPER ALLIANCE

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I. Introduction

The Environmental Integrity Project ("EIP"), Air Alliance Houston, Bayou City Waterkeeper, Center for Biological Diversity, Chesapeake Climate Action Network, Clean Air Council, Coastal Alliance to Protect Our Environment, Environment America, Environment Texas, Healthy Gulf, Hoosier Environmental Council, Indigenous Peoples of the Coastal Bend, Louisiana Bucket Brigade, PennEnvironment, Port Arthur Community Action Network, Sierra Club, Texas Campaign for the Environment, U.S. Public Interest Research Group, and Waterkeeper Alliance (collectively, "Commenters") respectfully submit these comments on Preliminary Effluent Guidelines Program Plan 15 ("Preliminary Plan 15") (Docket No. EPA-OW-2021-0547), published by the U.S. Environmental Protection Agency ("EPA" or "Agency") on September 14, 2021.[1]

Preliminary Plan 15 summarizes EPA's mandatory review of effluent limitation guidelines ("ELGs") and pretreatment standards for a variety of industrial point source categories. These comments are limited to EPA's review of the ELGs for the Petroleum Refining Point Source Category. EPA has not revised the ELGs for the petroleum refining industry since 1985, with some limits dating back to 1974. The Agency's latest review disregarded the statutory standards that dictate the appropriateness of revision by failing to study how the existing ELGs likely are less protective than federal law requires. As discussed in greater detail below, Commenters strongly urge EPA to complete a thorough review of the refinery ELGs, by assessing whether the ELGs are still based on today's best available technology and analyzing whether ELGs are appropriate for additional pollutants that are currently discharged by the industry.

II. Refineries Produce a Substantial Amount of Water Pollution.

In the mid-1970s, the petroleum refining industry included 256 facilities.[2] Since that time, overall industry production increased even though many small refineries ceased operations—as their capacity was replaced by increasing production at the larger existing facilities.[3] Based on EPA's latest estimate, the petroleum refining industry is comprised of 143 facilities, mostly concentrated along the Gulf of Mexico (mainly in Texas and Louisiana) and California.[4] In fact, 47 percent of refineries in the country are located in these three states.[5] Today, the industry as a whole refines approximately 18,600,000 barrels per day ("bbl/d") of crude oil [6] (*cf.* in 1976, the

[1] EPA, Preliminary Effluent Guidelines Program Plan 15 (Sept. 14, 2021) [hereinafter "Preliminary Plan 15"], *available at* https://www.epa.gov/system/files/documents/2021-09/ow-prelim-elg-plan-15_508.pdf.

[2] EPA, Preliminary Data Summary for the Petroleum Refining Category (Apr. 1996) [hereinafter "1996 Detailed Study Preliminary Summary"], at 8, *available at* https://www.epa.gov/sites/default/files/2015-10/documents/petro-refining-elg-study_1996.pdf.

[3] *Id.*

[4] EPA, Detailed Study of the Petroleum Refining Category – 2019 Report (Sept. 2019) [hereinafter "2019 Detailed Study"], at 4-1, *available at* https://www.regulations.gov/document/EPA-HQ-OW-2018-0618-0349.

[5] *See id.* at 4-3 tbl.4-1.

[6] *Id.* at 4-2.

industry produced around 16,357,000 bbl/d).[7] According to EPA, 90 refineries are direct dischargers, 30 are indirect dischargers, nine are both, two employ zero discharge, and 12 are unknown.

The petroleum refining industry processes raw crude petroleum into various petroleum products.[8] These products fall into three categories: (1) fuel products (e.g., gasoline, jet fuels, kerosene, liquefied petroleum, refinery fuel, and coke); (2) nonfuel products (e.g., asphalt and road oil, lubricants, and nonfuel coke); and (3) petrochemicals and petrochemical feedstocks (e.g., naphtha, ethane, propane, butane, ethylene, propylene, and butylene).[9] Refineries use various processes, such as fractionation, distillation, and cracking, to refine crude petroleum.[10]

Refineries generate large volumes of wastewater, including desalter water (water produced from washing the raw crude prior to topping operations); sour water (wastewater from steam stripping and fractionating operations that comes into contact with the crude being processed); other process water (wastewater from product washing, catalyst regeneration and dehydrogenation reactions); spent caustic (formed in extraction of acidic compounds from product streams); tank bottoms (bottom sediment and water that settles to the bottom of tanks used to store raw crude); once-through cooling water; condensate blowdown (from boilers and steam generators); ballast water (from product tankers); and stormwater.[11]

According to EPA's review of Toxics Release Inventory ("TRI") data, the petroleum refining industry ranked as the third largest industrial source of nitrogen water pollution in the country, discharging over 6 million pounds per year ("lbs/yr") of total nitrogen in 2015.[12] Petroleum refinery wastewater also contains a number of metals.[13] For metal discharges, EPA previously reviewed Discharge Monitoring Report ("DMR") data for 76 refineries from across the country and identified metals present in most petroleum refineries' effluent discharges that exceeded comparable treatability data for metals removals achieved by more recent technologies.[14]

From 2011 to 2015, EPA screened industrial dischargers through a toxicity ranking analysis ("TRA") in its odd-year annual reviews to identify and rank industries whose pollutant

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[7] 1996 Detailed Study Preliminary Summary at 8.

[8] EPA, Technical Support Document for the 2004 Effluent Guidelines Program Plan [hereinafter "2004 Technical Support Document"], at 7-9, *available at* https://www.epa.gov/sites/default/files/2015-10/documents/petro-refining-elg-study_2004.pdf.

[9] *Id.*; *see also* EPA, Petroleum Refining Effluent Guidelines (last accessed Oct. 5, 2021), *available at* https://www.epa.gov/eg/petroleum-refining-effluent-guidelines#whatis.

[10] 2004 Technical Support Document at 7-9.

[11] EPA, Petroleum Refining Effluent Guidelines (last accessed Oct. 5, 2021), *available at* https://www.epa.gov/eg/petroleum-refining-effluent-guidelines#whatis.

[12] Preliminary Effluent Guidelines Program Plan 14 (Oct. 2019) [hereinafter "Preliminary Plan 14"], at 3-5 fig.3-2.

[13] EPA, 2012 Annual Effluent Guidelines Review Report (Sept. 2014), at 5-26.

[14] EPA, Final 2012 and Preliminary 2014 Effluent Guidelines Program Plans (Sept. 2014), at 4-3.

discharges pose a substantial risk to human health and the environment.[15] Based on the toxic-weighted pound equivalents ("TWPE") released by each industry, refineries consistently ranked high each year that EPA conducted the TRA. More specifically, the petroleum refining industry ranked *third* in 2011 with a total TWPE of 731,000,[16] *third* in 2013 with a total TWPE of 1,430,000,[17] and *fourth* in 2015 with a total TWPE of 661,000.[18]

III. Refineries Are Located in Close Proximity to Environmental Justice Communities.

An analysis of the industry's 143 refineries reveals that many are located near vulnerable and under-resourced communities.[19] According to EJSCREEN, 64 percent of refineries are located in areas above the national average for percentage of population considered low-income, while 54 percent are located in areas above the national average for percentage of population identifying as people of color.[20] According to EPA's Greenhouse Gas Reporting Program data, 54 percent of refineries are also located in areas above the national average with respect to the proportion of residents under the age of five.[21] At least 28 refineries are located in areas that rank above the 80th percentile with respect to the proportion of residents considered low-income, and at least 38 refineries are located in areas that rank above the 80th percentile for proportion of residents identifying as people of color.[22]

To ensure that vulnerable and under-resourced communities are provided the same degree of protection from environmental and health hazards, EPA must thoroughly review water pollution from the refinery industry for opportunities to reduce the burdens on these communities. The evidence is clear that there are consistent adverse health impacts from living near refineries. As EPA has acknowledged, "some of the chemicals released [in refinery air pollution] are known or suspected cancer-causing agents, responsible for developmental and reproductive problems" and "may also aggravate certain respiratory conditions such as childhood asthma."[23] In terms of discharges to surface waters, refineries consistently rank as one of the largest industrial sources

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[15] *See id.* at 2-4; *see also* Preliminary Plan 14 at 2-4 (noting that "EPA last conducted the TRA in 2015" and that "the agency plans to further reduce the frequency of the TRA (e.g., every five years) . . . .").

[16] EPA, 2011 Annual Effluent Guidelines Review Report (Dec. 2012), at 1-1 tbl.1-1.

[17] EPA, 2013 Annual Effluent Guidelines Review Report (Sept. 2014), at 4-4 tbl.4-2.

[18] EPA, 2015 Annual Effluent Guidelines Review Report (June 2016), at 2-26 tbl.2-9.

[19] 2019 Detailed Study, Appx. A.

[20] EPA, *EJSCREEN: Environmental Justice Screening and Mapping Tool* (last accessed Oct. 12, 2021), *available at* https://www.epa.gov/ejscreen.

[21] EPA, *Greenhouse Gas Reporting Program Demographic Data Highlights* (last accessed Oct. 12, 2021), *available at* https://edap.epa.gov/public/extensions/GHGRP-Demographic-Data-Highlights/GHGRP-Demographic-Data-Highlights.html.

[22] *See supra* note 20.

[23] EPA, Environmental Update #12: Environmental Impact of the Petroleum Industry (June 2003), at 2, *available at* https://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.files/fileID/14522; *see also* EIP, Environmental Justice and Refinery Pollution (Apr. 28, 2021), *available at* https://environmentalintegrity.org/wp-content/uploads/2021/04/Benzene-report-4.28.21.pdf.

of nutrient and toxic water pollution, according to EPA's annual reviews.[24] Excessive nutrient pollution can lead to "harmful algal blooms, with impacts on drinking water, recreation, and aquatic life."[25] Meanwhile, exposure to metals can cause damage to the circulatory, respiratory, or digestive systems as well as neurological and developmental effects.[26] Many toxic pollutants, once in the environment, remain there for years, and continue to cause impacts.

IV. EPA Must Control Pollution from the Petroleum Refining Industry Through Increasingly Protective Effluent Limitation Guidelines.

The Clean Water Act ("CWA" or "Act") established a national goal to eliminate water pollution.[27] In furtherance of this goal, the Act requires EPA to promulgate increasingly stringent water pollution limits for certain classes and categories of industrial polluters and to revise these regulations to keep pace with advances in technology.[28] Through this mandate, the CWA guarantees "that similar point sources with similar characteristics" will achieve similar pollution-reduction targets regardless of their location, by charging EPA to set national minimum standards based on what is technologically achievable.[29]

Under the CWA, EPA must promulgate and "at least annually thereafter, revise, if appropriate" ELGs for facilities that discharge pollutants directly into surface waters.[30] To revise ELGs, EPA first must determine the amount of pollution reduction attainable by a particular industry through the application of appropriately advanced wastewater treatment technology.[31] Second, EPA must establish industry-specific minimum standards corresponding to the application of that technology.[32] And third, permitting officials must translate EPA's ELGs into specific effluent limitations and incorporate those limitations into each facility's National Pollutant Discharge

[24] *See supra* notes 12, 15–18.

[25] Preliminary Plan 14 at 3-3.

[26] EPA, Environmental Assessment for the Proposed Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category (May 29, 2013) [hereinafter "EPA Steam Electric Environmental Assessment"], at 5-6.

[27] 33 U.S.C. § 1251(a)(1).

[28] *See* 33 U.S.C. §§ 1311(b)(2), 1314(b), 1316, 1317(b)–(c); *see also Sw. Elec. Power Co. v. EPA*, 920 F.3d 999, 1005 (5th Cir. 2019) (explaining that the CWA is "'technology-forcing,' meaning it seeks to 'press development of new, more efficient and effective [pollution-control] technologies'" (alteration in original) (citing *Nat. Res. Def. Council, Inc. v. EPA*, 822 F.2d 104, 123 (D.C. Cir. 1987))).

[29] *Nat. Res. Def. Council, Inc. v. Train*, 510 F.2d 692, 709–10 (D.C. Cir. 1974) (citation omitted).

[30] 33 U.S.C. § 1314(b) (directing EPA to publish regulations establishing ELGs "[f]or the purpose of adopting or revising effluent limitations"); *see id.* § 1311; *see also Waterkeeper All., Inc. v. EPA*, 399 F.3d 486, 491 (2d Cir. 2005) ("The specific effluent limitations contained in each individual . . . permit are dictated by the terms of more general [ELGs], which are separately promulgated by the EPA.").

[31] 33 U.S.C. § 1314(b)(1).

[32] *Id.* § 1311(b)(2).

Elimination System—or "NPDES"—permit.[33] Congress charged EPA with setting ELGs for toxic and nonconventional pollutants such as ammonia and metals based on the "best available technology" standard—or "BAT."[34] The Ninth Circuit, citing the House Report for the 1972 CWA amendments, has stated that BAT can be based on one operating facility or even a pilot plant:

> It will be sufficient for the purposes of setting the level of control under available technology, that there be one operating facility which demonstrates that the level can be achieved or that there is sufficient information and data from a relevant pilot plant or semi-works plant to provide the needed economic and technical justification for such a new source.[35]

Courts have long recognized this Congressional intent when reviewing EPA's determinations in setting BAT limitations. For instance, in the context of steam-electric power plants, the Fifth Circuit ordered EPA to revise ELGs for the industry because "the [A]gency arbitrarily set BAT for legacy wastewater and leachate using the same archaic technology in place since 1982," even though other plants were using better technology.[36] In reaching its decision, the court acknowledged that "Congress intended [BAT] limitations to be based on the performance of the single best-performing plant in an industrial field."[37] Likewise, the Fourth Circuit has held that, "[i]n setting BAT, EPA uses not the average plant, but the optimally operating plant, the pilot plant which acts as a beacon to show what is possible."[38] By requiring the application of BAT, EPA's annual review and revision cycle ensures that the industry will make "further progress toward the national goal of eliminating the discharge of all pollutants,"[39] thereby effectuating the "technology-forcing" mechanism of the CWA.[40]

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[33] *Id.* § 1342; *see Waterkeeper All., Inc.*, 399 F.3d at 491("The specific effluent limitations contained in each individual . . . permit are dictated by the terms of more general [ELGs], which are separately promulgated by the EPA.").

[34] 33 U.S.C. §§ 1311(b)(2), 1314(b)(2); *see Sw. Elec. Power Co.*, 920 F.3d at 1006 (explaining that "BAT . . . has applied to existing, direct discharges of toxic and non-conventional pollutants since March 31, 1989.").

[35] *See Ass'n of Pac. Fisheries v. EPA*, 615 F.2d 794, 816 (9th Cir. 1980) (citing *Cong. Research Serv., A Legislative History of the Water Pollution Control Act Amendments of 1972*, at 798 (1973)).

[36] *Sw. Elec. Power Co.*, 920 F.3d at 1004.

[37] *Id.* at 1018. (quoting *Tex. Oil & Gas Ass'n v. EPA*, 161 F.3d 927, 928 (5th Cir. 1998) (internal quotation marks omitted).

[38] *Kennecott v. EPA*, 780 F.2d 445, 448 (4th Cir. 1985) (citing *A Legislative History of the Water Pollution Control Act Amendments of 1972*, 93d Cong., 1st Sess. (Comm. Print 1973), at 798).

[39] 33 U.S.C. § 1311(b).

[40] *Nat. Res. Def. Council, Inc.*, 822 F.2d at 122.

A. The Existing Refinery ELGs Are Outdated and Were Last Promulgated or Revised in the 1970s and 1980s.

When EPA first promulgated ELGs for the Petroleum Refining Point Source Category in 1974,[41] the Agency divided the industry into five discrete process-based subcategories:

- *Topping Refineries (Subcategory A)*
  - Basic refinery operations include "topping and catalytic reforming, whether or not the facility includes any other process in addition to topping and catalytic reforming."[42]
- *Cracking Refineries (Subcategory B)*
  - Basic refinery operations include "topping and cracking, whether or not the facility includes any process in addition to topping and cracking."[43]
- *Petrochemical Refineries (Subcategory C)*
  - Basic refinery operations include "topping, cracking, and petrochemical operations whether or not the facility includes any process in addition to topping, cracking, and petrochemical operations."[44]
- *Lube Refineries (Subcategory D)*
  - Basic refinery operations include "topping, cracking, and lube oil manufacturing processes, whether or not the facility includes any process in addition to topping, cracking, and lube oil manufacturing processes."[45]
- *Integrated Refineries (Subcategory E)*
  - Basic refinery operations include "topping, cracking, lube oil manufacturing processes, and petrochemical operations, whether or not the facility includes any process in addition to topping, cracking, lube oil manufacturing processes, and petrochemical operations."[46]

In promulgating the ELGs, the Agency established limits for ammonia, sulfide, phenolics, total chromium, hexavalent chromium, chemical oxygen demand, biological oxygen demand, oil & grease, total suspended solids, and pH.[47] In 1985, EPA revised the ELGs for total chromium, hexavalent chromium, and phenolic compounds based on BAT.[48]

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[41] *See* 39 Fed. Reg. 16,560 (May 9, 1974).

[42] 40 C.F.R. § 419.10.

[43] *Id.* § 419.20.

[44] *Id.* § 419.30.

[45] *Id.* § 419.40.

[46] *Id.* § 419.50.

[47] *See generally id.* Part 419.

[48] 50 Fed. Reg. 32,414 (Aug. 12, 1985).

The refinery ELGs set production-based mass limits (i.e., the amount of allowable pollution increases in scale with the size of the refining capacity).[49] This allows larger refineries to have higher limits and discharge larger amounts of pollution than smaller refineries, even if the larger refineries can meet lower mass-based limits.

EPA has not revised the ELGs for the petroleum refining industry in at least 36 years.

B. <u>EPA's Most Recent Detailed Study Failed to Analyze Whether the Existing Refinery ELGs Still Represent Best Available Technology.</u>

In 2014, EPA began a detailed study into the petroleum refining industry to determine if changes to the existing ELGs were needed.[50] The detailed study focused on whether the implementation of wet air-pollution controls, as well as changes in feedstock, may result in an increased discharge of metals from petroleum refineries, potentially at concentrations above treatable levels.[51] In 2019, after years of detailed review into the industry, EPA determined that "the data gathered during the detailed study was *inconclusive* and did not demonstrate whether or not the implementation of wet air-pollution controls, or the changes in weight of the raw crude processed by the petroleum refining industry, have had an impact on the characteristics of the wastewater generated by the industry."[52]

EPA also stated that the detailed review "did not evaluate whether the existing Refinery ELGs continue to represent BAT . . . . In addition, because of limitations of the wastewater characteristics data collected, EPA did not identify whether there are any additional pollutants that an updated BAT should target."[53] Yet the Agency ended the detailed study and decided to not take further action on the refinery ELGs.[54] Thus, EPA failed, over the course of a multi-year review, to consider the very questions that would establish the necessity of updating these limits.

V. EPA Must Conduct a Thorough Review of the Effluent Limitation Guidelines for the Petroleum Refining Industry.

To meet its CWA mandate of setting increasingly protective ELGs, EPA must conduct a thorough review of the refinery ELGs. *First*, EPA must establish whether the existing ELG limits still represent the amount of pollution reduction attainable through the application of appropriately advanced wastewater treatment technology. DMR data indicate that the ELGs are no longer driving down reductions in ammonia pollution—which should be based on BAT, and that the production-based limits are unnecessarily permitting larger refineries to send more pollution to waterways. *Second*, the Agency must determine whether the ELGs must be updated

[49] 2019 Detailed Study at 2-2.

[50] *Id.* at 1-2.

[51] *Id.*

[52] Preliminary Plan 14 at 4-1 (emphasis added).

[53] EPA, Comment Response Document for Preliminary Plan 14 (Dec. 2020), at 77.

[54] EPA, Effluent Guidelines Program Plan 14 (Jan. 2021), at 6-1.

to control additional pollutants. Available pollution data indicate that refineries may be discharging significant quantities of metals and other toxics into the country's rivers and streams.

A. Ammonia Discharge Monitoring Report Data Indicate That the Refinery Effluent Limitation Guidelines Are No Longer Based on Best Available Technology

EPA has not revised the refinery ELGs for ammonia since those limits were promulgated in 1974.[55] EIP reviewed 2018–2020 ammonia DMR data obtained from EPA's Environment and Compliance History Online ("ECHO") website, NPDES permits, and NPDES permit fact sheets for 45 direct-discharging refineries.[56] This review shows that the refinery ELGs are no longer pushing the industry to decrease ammonia pollution. Out of the 45 facilities, 25 refineries have effluent limitations based on the refinery ELGs; 20 refineries have more stringent effluent limitations than required by ELGs due to other considerations (e.g., have water quality-based limits); and two have outfalls subject to both ELG-based limits and more stringent limits (*see* Table A, below).[57]

Table A. Reported Ammonia Monthly Average Loading Rates and Limits

		All Refineries Reviewed (45) (lbs/d)		**Refineries with ELG-based Limits (27) (lbs/d)**		**Refineries with More Stringent Limits (22) (lbs/d)**	
		Average	*Highest*	*Average*	*Highest*	*Average*	*Highest*
Reported Values	Minimum	<1	<1	<1	<1	1.47	7.1
	Mean	33.5	161.23	47.27	224.58	15.59	64.38
	Maximum	457.39	1,224	457.39	1,224	35.52	161
Permit Limits	Minimum	0.28		0.28		6.26	
	Mean	606.07		804.93		401.36	
	Maximum	2361		2361		1910	
	# Limits	69		35		34	

The 2018–2020 DMR data indicate that the ELGs are not driving down ammonia water pollution in two ways. *First*, the DMRs show that most refineries are discharging well below ELG-based limits. For example, for outfalls with limits based on the ELGs, refineries discharged an average of 91 percent less ammonia than permit limits require. *Second*, the data also indicate the refineries that have installed technology to meet more protective limits are also able to consistently reduce their pollution to rates more restrictive than what the ELGs require. For outfalls with more protective limits than the ELGs, refineries discharged an average of 82

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[55] *See* 39 Fed. Reg. 16,560 (May 9, 1974).

[56] *See* EIP, 2018–2020 Ammonia Refinery DMR Analysis (Oct. 2021) (attached hereto as Attachment A).

[57] *Id.*

percent less ammonia than permit limits require.[58] Table A displays a summary of the mean ammonia monthly averages reported by facilities on their 2018–2020 DMRs and associated permit limits from EIP's review of 45 refineries. For refinery outfalls with ELG-based limits, the highest ammonia monthly average discharged was 1,224 pounds per day ("lbs/d"). In comparison, refinery outfalls with more protective limits discharged over *seven times less* ammonia—as the highest ammonia monthly average discharge reported by those facilities was 161 lbs/d.

Clearly, the refinery ELGs for ammonia are no longer driving down pollution and are no longer based on BAT, as more advanced technology exists to reduce ammonia pollution from the petroleum refining industry.

B. EPA Needs to Forego Production-Based Effluent Limitation Guidelines for Refineries.

EPA should revise the refinery ELGs to replace existing production-based limits with straightforward concentration-based or mass-based limits for two overarching reasons. *First*, a review of the 2018–2020 ammonia DMR data clearly shows that larger refineries can discharge ammonia at similar rates as smaller facilities.[59] For example, the Baton Rouge Refinery (NPDES Permit No. LA0005584) has an ELG-based monthly average ammonia limit of 2,361 lbs/d. It has the largest production capacity of the 45 refineries reviewed by EIP—523,000 bbl/d.[60] Meanwhile, Martin Operating (NPDES Permit No. AR0000591) has the second smallest production capacity, refining 7,700 bbl/d with a non-ELG based monthly average ammonia limit of 37.15 lbs/d.[61] Despite this significant difference in production capacity, both refineries discharged roughly the same monthly average of ammonia—as the Baton Rouge Refinery discharged a mean monthly average ammonia of 16.80 lbs/d from 2018–2020 and Martin Operating discharged a mean monthly average ammonia of 17.91 lbs/d over that same timeframe.[62] In addition, Figure 1 plots the mean ammonia monthly average discharges reported by each of the 45 refineries against their production capacity.[63] The figure shows that based on these DMR data, most refineries—and in fact, all refineries with more stringent limits than the ELGs—discharged less than 100 lbs/d of ammonia, on average, regardless of production capacity.

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[58] *See id.*

[59] *Id.*

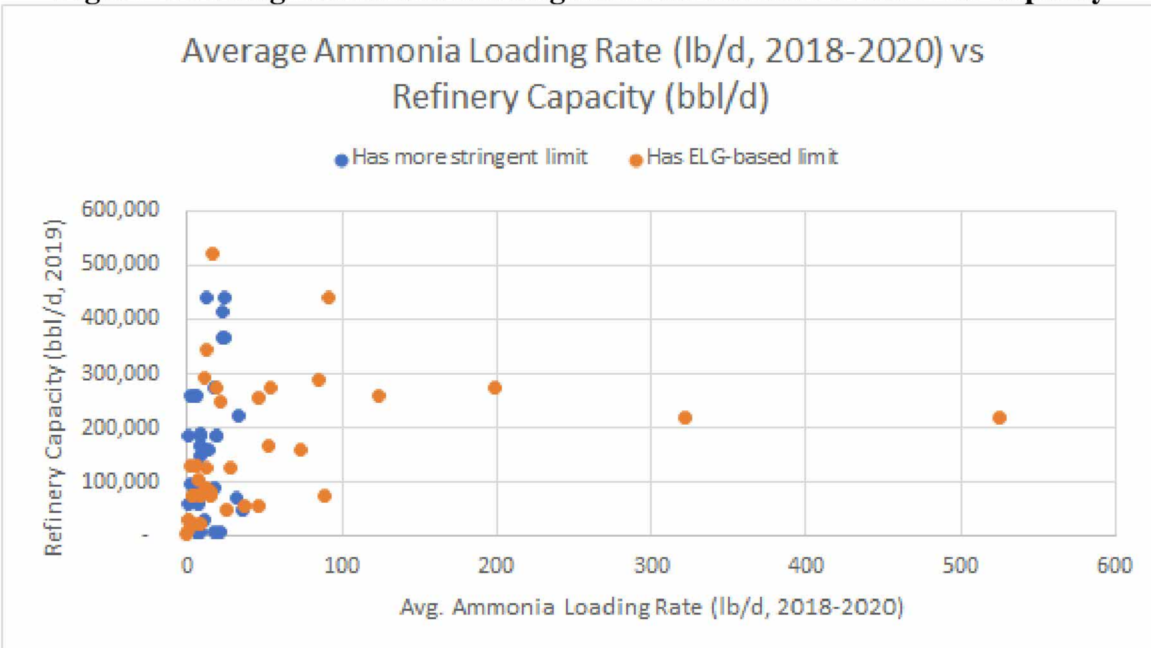
[60] *Id.*

[61] *Id.*

[62] *Id.*

[63] U.S. Energy Information Administration, *Refinery Capacity Report Archives* (Jan. 1, 2019), *available at* https://www.eia.gov/petroleum/refinerycapacity/archive/2019/refcap2019.php.

Figure 1. Average Ammonia Loading Rates for Refineries Based on Capacity



Second, although large refineries *can* discharge ammonia at similar rates as smaller facilities, the ELGs unnecessarily allow large refineries to send more ammonia into waterways. For example, Marathon's Catlettsburg Refinery in Kentucky (NPDES Permit No. KY0000388) has a production capacity of 292,000 bbl/d. Although Catlettsburg has an ELG-based monthly average ammonia limit of 2,017 lbs/d, its highest ammonia monthly average discharge rate reported in 2018–2020 was only 64.4 lbs/d.[64] In comparison, Marathon's smaller Mandan Refinery in North Dakota (NPDES Permit No. ND0000248) has a production capacity of 74,000 bbl/d. Mandan's ELG-based monthly average ammonia limit allows the refinery to discharge up to 226.72 lbs/d, but its highest monthly average discharge rate was 103.4 lbs/d. The existing production-based ELGs give larger refineries the unwarranted luxury of expanding and increasing water pollution loads without falling out of compliance or upgrading their wastewater treatment systems. EPA should therefore revise the refinery ELGs to forego production-based limits.

C. <u>EPA Should Determine Whether Limits for New Pollutants Not Currently Regulated Under the Existing Refinery ELGs Are Necessary to Protect Human Health and the Environment.</u>

In addition to pollutants subject to the refinery ELGs, a review of available pollution data indicates that the petroleum refining industry may be discharging other pollutants not currently regulated under the existing ELGs at significant quantities. These other pollutants—including nitrates, selenium, mercury, and nickel—can be toxic to human health, aquatic life, and wildlife.

[64] *Id.*

EPA should review the industry's discharges of these and other potentially toxic pollutants to determine whether new ELGs are warranted for refineries.

1. Nitrates

Commenters urge EPA to revise the refinery ELGs to incorporate an effluent limitation for nitrates. *First*, available pollution data indicate that refineries are a significant source of nitrates. According to EPA's review of 2015 TRI data, the petroleum refining industry is the third largest source of total nitrogen industrial water pollution in the country.[65] A closer review of TRI data reveals that discharges of nitrate compounds from the petroleum refining industry have steadily increased since the 1990s (*see infra* Figure 2). For example, nitrate discharges have increased *by 60 percent* over the past 20 years (*cf.* 17,130,351 lbs in 1999 *with* 27,458,541 lbs in 2019).[66]

However, the refinery ELGs do not currently limit the amount of nitrates discharged by the industry.[67] EIP also reviewed NPDES permit applications for 38 direct-discharging refineries. This review showed that few refineries have installed modern technology with nutrient removal, particularly denitrification systems to remove nitrates from wastewater.[68] On NPDES permit applications, industries must report discharge concentrations for a list of pollutants, including nitrate/nitrite, using representative sampling even if the facility's permit does not require continued monitoring and reporting of these pollutants on their DMRs. Out of the 38 facilities reporting nitrate/nitrite concentrations on their permit applications, the quintile of refineries with the lowest reported concentrations of nitrate/nitrite discharged 0.76 milligrams/liter ("mg/L") or less of that pollutant.[69] To compare, the worst performing quintile discharged between 20.38 mg/L and 54 mg/L of nitrate/nitrite, which is as much as *71 times worse* than those with the lowest reported nitrate concentrations.[70]

[65] Preliminary Plan 14 at 3-5 fig.3-2.

[66] *See* EPA, *Toxics Release Inventory (TRI) Program* (last accessed Oct. 7, 2021) [hereinafter "TRI website"], *available at* https://www.epa.gov/toxics-release-inventory-tri-program.

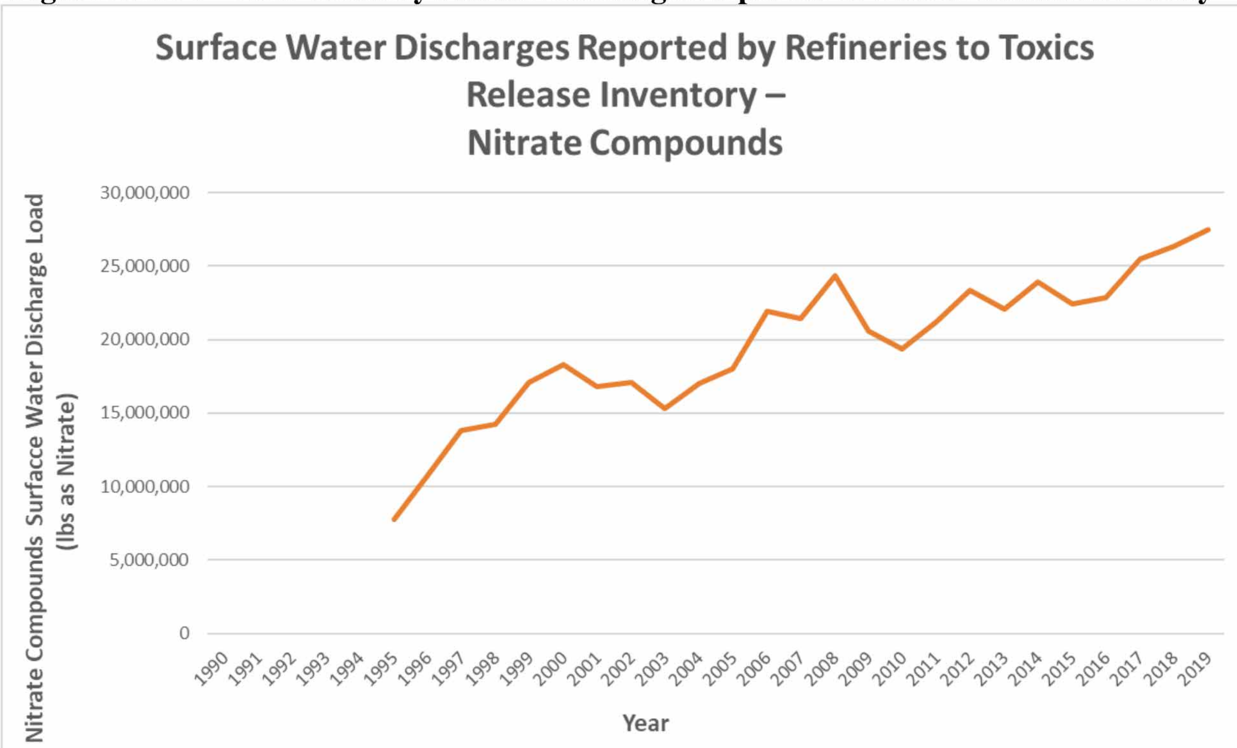
[67] *See generally* 40 C.F.R. Part 419.

[68] *See* EIP, Review of Refinery NPDES Permit Applications (Oct. 2021) (attached hereto as Attachment B).

[69] *Id.*

[70] *Id.*

Figure 2. 1990 – 2019 Refinery Nitrate Discharges Reported to Toxics Release Inventory[71]



Second, nitrate pollution harms human health and the environment. As EPA recognized when it first promulgated the refinery ELGs, "[n]itrates are considered to be among the poisonous ingredients of mineralized waters . . . ."[72] "Excess nitrates cause irritation of the mucous linings of the gastrointestinal tract and the bladder" leading to symptoms such as "diarrhea and diuresis . . . ."[73] Nitrate is a compound of total nitrogen, which in turn, is a form of nutrient pollution.[74] According to EPA, "[n]utrient pollution is one of the most widespread, costly, and challenging environmental problems impacting water quality in the United States."[75] EPA has acknowledged that excessive nitrogen water pollution "can lead to a variety of problems, including . . . harmful algal blooms, with impacts on drinking water, recreation, and aquatic life."[76]

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[71] *See* TRI website. A facility must report discharges of nitrate only if in the reporting year, that particular facility (1) manufactured more than 25,000 pounds of nitrate, (2) processed more than 25,000 pounds of nitrate, or (3) otherwise used more than 10,000 pounds of nitrate. *See* EPA, TRI Chemical List (last accessed Oct. 7, 2021), *available at* https://ordspub.epa.gov/ords/guideme_ext/f?p=guideme:chemical-list-basic-search.

[72] EPA, Development Document for Effluent Limitation Guidelines and New Source Performance Standards for the Petroleum Refining Point Source Category (Apr. 1974), at 78, *available at* https://www.epa.gov/sites/default/files/2015-10/documents/petro-refining_dd_1974.pdf.

[73] *Id.*

[74] USGS, *Nitrogen and Water* (last accessed Oct. 7, 2021), *available at* https://www.usgs.gov/special-topic/water-science-school/science/nitrogen-and-water?qt-science_center_objects=0#qt-science_center_objects.

[75] Preliminary Plan 14 at 3-3.

[76] *Id.*

Third, modern technology clearly exists to reduce industrial nitrate water pollution. EPA may identify BAT as a technology not yet in use in the industry, as "[p]rogress would be slowed if EPA were invariably limited to treatment schemes already in force at the plants which are the subject of the rulemaking."[77] Publicly owned treatment works ("POTWs") have reduced the amount of nutrient pollution in their wastewater by removing nitrates using Enhanced Nutrient Removal—or "ENR"—technology.[78] In fact, many POTWs are using ENR to achieve total nitrogen concentrations of less than 3 mg/L.[79] For instance, the State of Maryland required 66 major POTWs to upgrade their treatment technologies to ENR.[80] These facilities are expected to discharge total nitrogen concentrations of *3 mg/L or less* after these upgrades are installed.[81] As of July 2021, 64 of these 66 POTWs have installed and are fully operating their ENR treatment technologies.[82] Finally, as EPA noted in Preliminary Plan 14, the Water Environment Research Foundation has identified a combination of technologies that can achieve total nitrogen concentrations of less than 2 mg/L.[83]

2. *Selenium*

In addition, Commenters urge EPA to conduct a more thorough review of selenium discharges from the petroleum refining industry given the industry's growing selenium discharges and the detrimental harm caused by selenium water pollution. Available pollution data suggest that refineries are discharging a considerable amount of selenium into the country's rivers and streams. According to TRI, selenium discharges from refineries have increased *by 65 percent* since the 1990s.[84] More specifically, while refineries reported discharging approximately 1,593 lbs/yr of selenium in the 1990s, the industry discharged around 4,541 lbs/yr of selenium in the 2010s (*see infra* Figure 3).[85]

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[77] *See Kennecott*, 780 F.2d at 453 (explaining that "Congress . . . asked EPA to survey related industries and current research to find technologies which might be used to decrease the discharge of pollutants," because "[p]rogress would be slowed if EPA were invariably limited to treatment schemes already in force at the plants which are the subject of the rulemaking").

[78] *See, e.g.*, Iowa Dept. of Agric. & Land Stewardship et al., Nutrient Reduction Strategy (Dec. 2017), at 2 (discussing "three tiers of nutrient removal" and describing "Enhance Nutrient Removal" as "[Biological Nutrient Reduction] with chemical precipitation and granular media filtration").

[79] *See, e.g.*, Md. Dept. of the Env't, *The Evolution to Enhanced Nutrient Removal*, *available at* https://mde.state md.us/programs/Water/BayRestorationFund/Pages/evolution_enr.aspx.

[80] *Id.*

[81] *Id.*

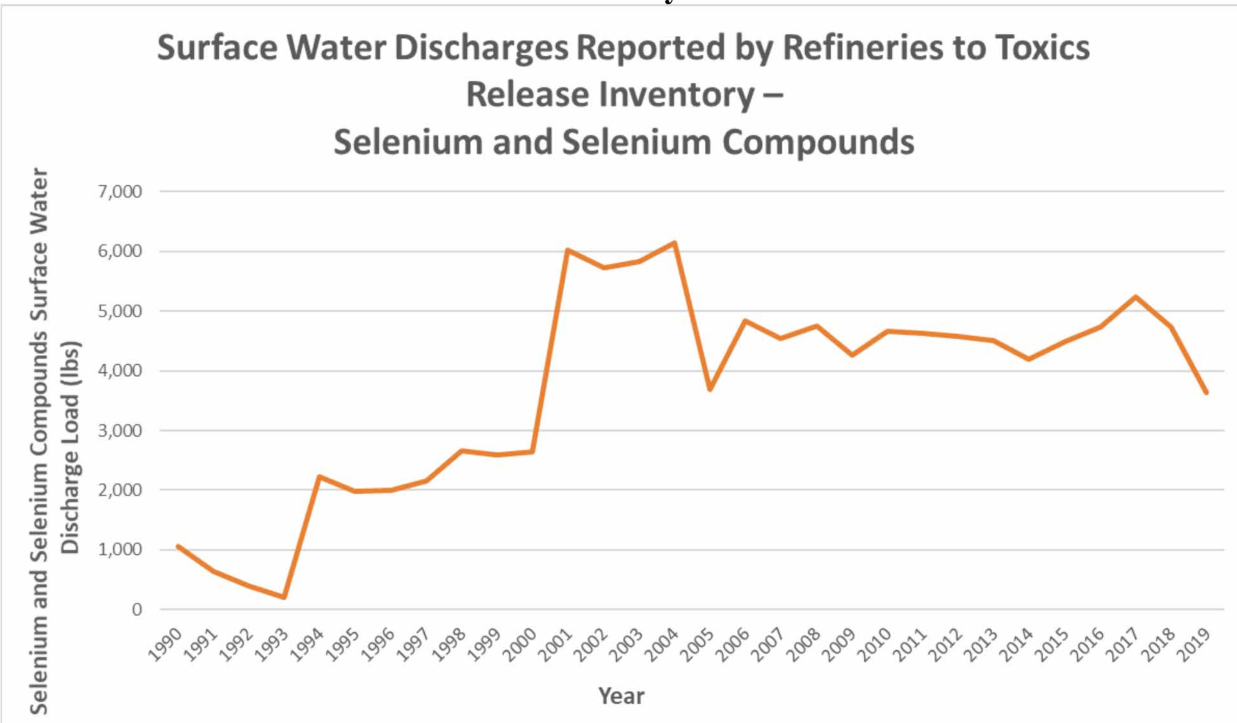
[82] Md. Dept. of the Env't, *Bay Restoration Fund Targeted Wastewater Treatment Plants* (Jul. 2021), *available at* https://mde.maryland.gov/programs/Water/BayRestorationFund/Documents/7-21-BRF-WWTP%20Update%20for%20BayStat.pdf.

[83] *See* Preliminary Plan 14 at 3-8–3-9 (showing a "Level 5" treatment level with a "treatment level objective" of 2 mg/L for total nitrogen).

[84] *See* TRI website.

[85] *Id.*

Figure 3. 1990 – 2019 Refinery Selenium Discharges Reported to Toxics Release Inventory[86]



Meanwhile, a review of permit applications for 33 refineries reporting selenium discharges shows the quintile with the lowest concentrations of selenium discharged 14.4 micrograms per liter ("µg/L") or less of the pollutant while the worst performing quintile discharged between 117.2 and 410 µg/L of selenium.[87] For comparison, the National Primary Drinking Water Regulations have a Maximum Contaminant Level—or "MCL"—of 50 µg/L.[88] Long-term human exposure to levels above 50 µg/L could result in hair or fingernail loss, numbness in fingers and toes, and circulatory problems.[89]

Selenium is one of the primary pollutants identified by EPA as causing documented environmental impacts to people, fish, and wildlife.[90] EPA reviewed over 100 case studies on selenium discharges and their environmental impacts, finding that 80 case studies showed

[86] A facility must report discharges of selenium only if in the reporting year, that particular facility (1) manufactured more than 25,000 pounds of selenium, (2) processed more than 25,000 pounds of selenium, or (3) otherwise used more than 10,000 pounds of selenium. *See* EPA, TRI Chemical List (last accessed Oct. 7, 2021), *available at* https://ordspub.epa.gov/ords/guideme_ext/f?p=guideme:chemical-list-basic-search.

[87] Attachment B: EIP, Review of Refinery NPDES Permit Applications.

[88] A "MCL" is the highest level of a contaminant that is allowed in drinking water. *See* EPA, National Primary Drinking Water Regulations (last accessed Oct. 7, 2021), *available at* https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations.

[89] *Id.*

[90] EPA Steam Electric Environmental Assessment at 6-25.

damages to surface water quality and 43 case studies showed damages to ground water quality.[91] Studies also found that elevated selenium concentrations were likely the primary contributor to fish kills in lakes and reservoirs, decreasing population density and community diversity.[92] In 1992, the Texas Department of Health issued a fish consumption advisory for three reservoirs receiving elevated levels of selenium water pollution after determining that the level of selenium in fish could pose a potential health risk to humans, especially children six years or younger and pregnant women.[93]

3. Mercury

Commenters also recommend that EPA review the mercury discharges from refineries due to the increases in mercury water pollution from the industry and the potential harm to people and the environment. According to TRI, mercury discharges from the industry have increased *by 98 percent* since the 1990s. For example, refineries reporting to TRI discharged approximately 3.9 lbs/yr of mercury in the 1990s.[94] In comparison, refineries discharged a record high 232 lbs of mercury in 2019.[95]

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[91] *Id.*

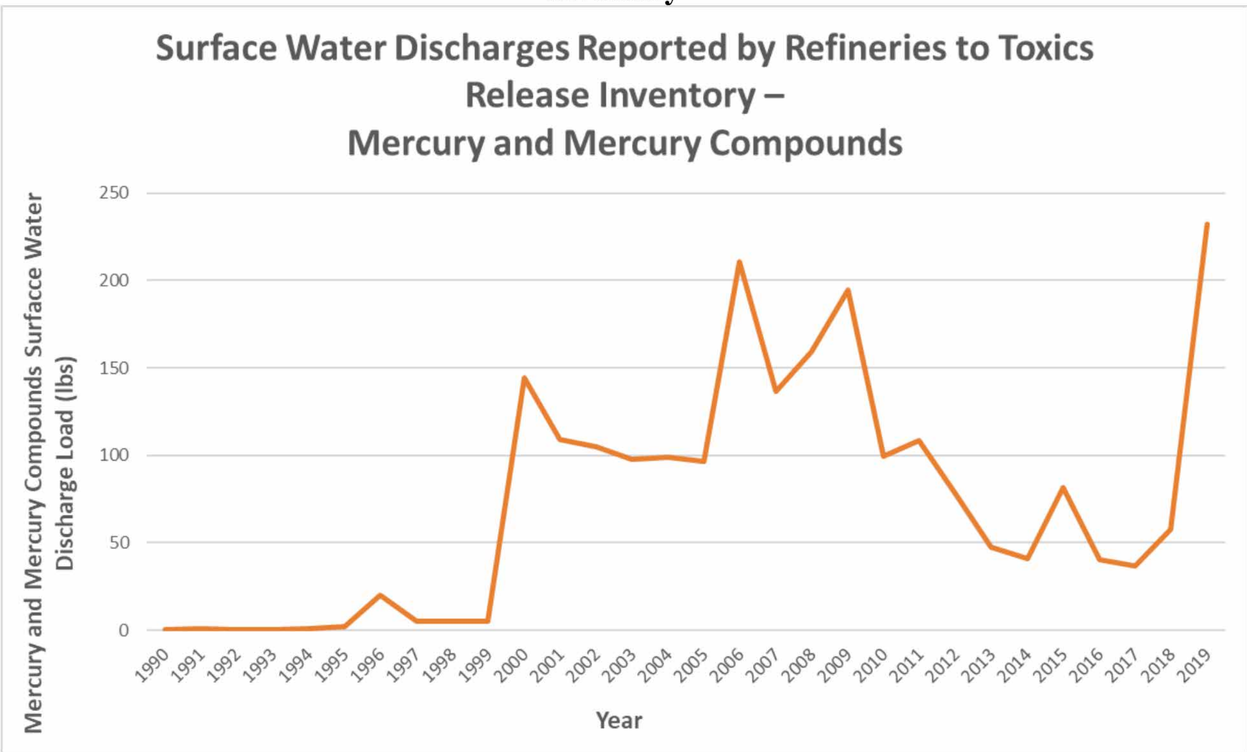
[92] *Id.* at 5-2.

[93] *Id.* at 5-6–5-7.

[94] TRI website.

[95] *Id.*

Figure 4. 1990 – 2019 Refinery Mercury Discharges Reported to Toxics Release Inventory[96]



A review of permit applications for 27 refineries reporting mercury discharges shows that the quintile reporting the lowest mercury concentrations discharged as much as 8.15 nanograms per liter ("ng/L") of mercury whereas the worst performing quintile discharged between 136 and 1,300 ng/L of mercury to surface waters.[97] For reference, the chronic freshwater aquatic life criteria for mercury is 770 ng/L. Mercury is one of the most serious contaminants threatening the country's waterways because it is a potent poison in fish, wildlife, and people.[98] In terms of human health risks, mercury is most harmful to the developing brains of unborn children and young children by causing brain damage, incoordination, blindness, seizures, inability to speak, nervous and digestive system problems, and kidney damage.[99]

[96] A facility must report discharges of mercury only if in the reporting year, that particular facility (1) manufactured more than 25,000 pounds of mercury, (2) processed more than 25,000 pounds of mercury, or (3) otherwise used more than 10,000 pounds of mercury. *See* EPA, TRI Chemical List (last accessed Oct. 7, 2021), *available at* https://ordspub.epa.gov/ords/guideme_ext/f?p=guideme:chemical-list-basic-search.

[97] Attachment B: EIP, Review of Refinery NPDES Permit Applications.

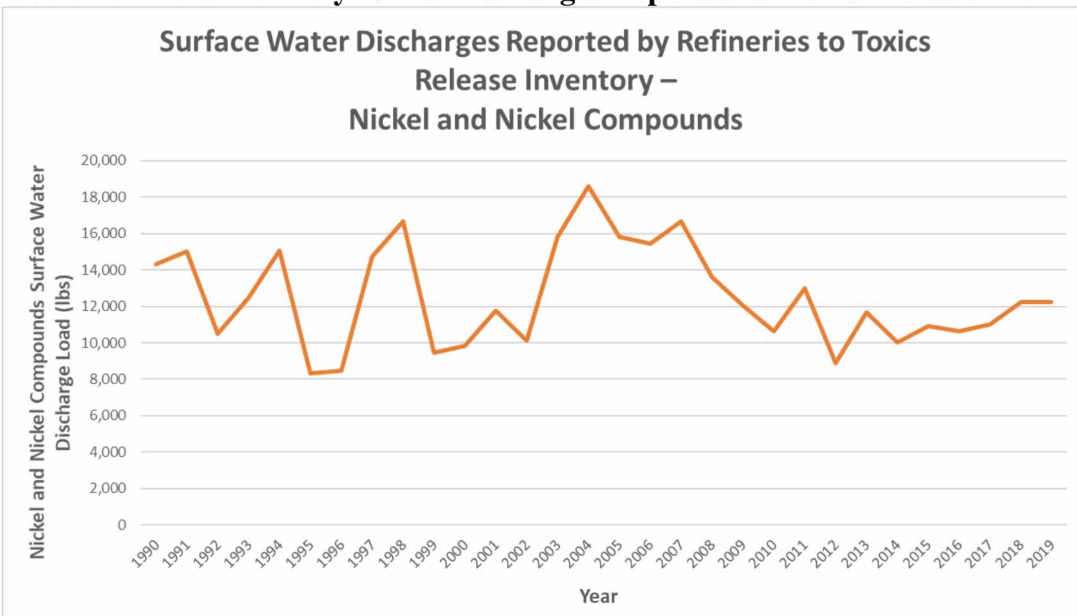
[98] USGC, *Mercury Contamination of Aquatic Environments* (last accessed Oct. 7, 2021), *available at* https://www.usgs.gov/special-topic/water-science-school/science/mercury-contamination-aquatic-environments?qt-science_center_objects=0#qt-science_center_objects.

[99] Agency for Toxic Substances and Disease Registry, *ToxFAQs for Mercury* (last accessed Oct. 8, 2021), *available at* https://wwwn.cdc.gov/TSP/ToxFAQs/ToxFAQsDetails.aspx?faqid=113&toxid=24.

4. Nickel

Lastly, Commenters recommend that EPA review whether the industry's nickel discharges warrant a new ELG limit due to its consistent rank as one of the top industrial sources of nickel water pollution and the potential impact to human health and the environment. According to TRI, the petroleum refining industry has placed in the top five largest sources of industrial nickel water pollution since 1990 and has maintained the rank of the *second largest source* of industrial nickel pollution since 2002.[100] From 1990–2019, refineries have reported discharging an average of 12,534 lbs/yr of nickel to surface waters.[101]

Figure 5. 1990 – 2019 Refinery Nickel Discharges Reported to Toxics Release Inventory[102]



A review of permit applications for 25 refineries reporting nickel discharges shows that the quintile reporting the lowest nickel concentrations discharged as much as 3.54 µg/L of nickel whereas the worst performing quintile discharged between 18.44 and 76 µg/L of the pollutant to surface waters.[103] For reference, the chronic freshwater aquatic life criteria for nickel is 52 µg/L. Exposure to metals such as nickel can cause non-cancer effects in humans, including damage to the circulatory, respiratory, or digestive systems and neurological and developmental effects.[104]

[100] TRI website.

[101] *Id.*

[102] A facility must report discharges of nickel only if in the reporting year, that particular facility (1) manufactured more than 25,000 pounds of nickel, (2) processed more than 25,000 pounds of nickel, or (3) otherwise used more than 10,000 pounds of nickel. *See* EPA, TRI Chemical List (last accessed Oct. 7, 2021), *available at* https://ordspub.epa.gov/ords/guideme_ext/f?p=guideme:chemical-list-basic-search.

[103] Attachment B: EIP, Review of Refinery NPDES Permit Applications.

[104] EPA Steam Electric Environmental Assessment at 5-6.

VI. Conclusion

To summarize, Commenters respectfully request that EPA conduct a thorough review of the refinery ELGs as available pollution data suggest that *first*, the existing ELGs no longer represent BAT and *second*, ELGs for additional pollutants are warranted.

Thank you for considering our comments.

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INDEX OF ATTACHMENTS

ATTACHMENT	TITLE
A	2018–2020 Ammonia Refinery DMR Analysis (Oct. 2021)
B	Review of Refinery NPDES Permit Applications (Oct. 2021)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Preliminary Effluent Guidelines Program Plan 15 86 Fed. Reg. 51,155 (Sept. 14, 2021)	Docket ID No. EPA-HQ-OW-2021-0547

COMMENTS OF FOOD & WATER WATCH

Submitted electronically: www.regulations.gov

Submitted on behalf of the commenter listed above by:

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I. INTRODUCTION

Food & Water Watch ("FWW") respectfully submits these comments on Preliminary Effluent Guidelines Program Plan 15 ("Preliminary Plan 15") (Docket No. EPA-OW-2021-0547), published by the U.S. Environmental Protection Agency ("EPA" or "Agency") on September 14, 2021.[1]

Preliminary Plan 15 summarizes EPA's mandatory annual review of Clean Water Act ("CWA") effluent limitation guidelines ("ELGs") and pretreatment standards for all 59 existing industrial point source categories. This comment focuses on EPA's review of ELGs for the Concentrated Animal Feeding Operation[2] ("CAFO") category, and its decision not to revise CAFO ELGs, as announced in the Plan. CAFOs are one of the leading known sources of water pollution in the country, and present a clear threat to human health and the environment.[3] EPA cannot rely on its current review and ranking methodology, which is based solely on discharge monitoring report ("DMR") data, to accurately characterize the polluting impacts of the CAFO category, because of an overwhelming lack of discharge monitoring requirements imposed on CAFOs. In addition, the Agency has substantial factual evidence before it to demonstrate the inadequacy of current ELGs, which are failing to control the discharge of CAFO waste. Finally, because more effective and low-cost management practices and control technologies are available, current CAFO standards no longer reflect Best Available Technology ("BAT"), as required by the CWA. For these reasons, FWW urges EPA to update its review methodology as applied to the CAFO industry, conduct a proper review of the CAFO industry, and revise ELGs for the CAFO industry without delay.

II. EPA's Review Methodology Does Not Accurately Characterize CAFO Pollution

In Preliminary Plan 15, EPA announced that the Agency was not planning to revise CAFO ELGs at this time based on its "general methodology and results from the 2020 annual review,"[4] and because it did "not have data indicating that these categories discharge quantities of pollutants that would warrant revising the ELGs at this time."[5] However, EPA's current review methodology effectively ensures this result, because it is based on incredibly sparse and non-representative CAFO pollution data that EPA knows to be incomplete and inaccurate.

According to EPA's stated annual review methodology, the agency conducts an initial screening of point source categories to "identify categories that have a relatively high pollutant concentration discharges compared to other [point source categories]" to rank and prioritize for further review and revision only those that are responsible for the top 25 percent of highest median pollutant concentrations.[6] In EPA's 2019 review, it focused its rankings analysis on

[1] EPA, Preliminary Effluent Guidelines Program Plan 15 (Sept. 14, 2021) [hereinafter "Preliminary Plan 15"], https://www.epa.gov/system/files/documents/2021-09/ow-prelim-elg-plan-15_508.pdf

[2] *See* 40 C.F.R. part 412.

[3] Preliminary Plan 15, at 5-2; EPA, 2017 National Water Quality Inventory Report to Congress, 8, 11, 18 (Aug. 2017)

[4] Preliminary Plan 15, at 5-2.

[5] *Id.* at 5-1.

[6] *Id.* at 5-2 – 5-4.

industry-wide pollution loads to "identify industries with potentially greater nutrient loads relative to other[s']" to rank and prioritize for further review and revision only those that are responsible for the majority of pollution.[7] However, the pollution data upon which concentration and load rankings are based come from discharge monitoring reports, self-reported discharge data that only tracks "pollutants that a facility is required, by permit, to monitor."[8] As a result of this process, the CAFO point source category received a relatively low ranking in both EPA's 2020 and 2019 annual reviews, and was consequently excluded from further review or revision.[9]

There is a fatal flaw in EPA's review logic when it comes to the CAFO industry. Simply put, neither EPA nor the vast majority of state permitting authorities require CAFOs to monitor their discharges at all.[10] EPA does not require permitted CAFOs to conduct periodic, representative effluent sampling or submit the results regularly via discharge monitoring reports, as EPA rejected water quality monitoring requirements in prior rulemakings in favor of limited manure and soil nutrient sampling. This non-effluent sampling does not provide any concentration or load information relevant to EPA's CAFO ELG requirements to prevent production area discharges and minimize the potential for nutrient pollution from land application fields.[11] In fact, the Ninth Circuit recently confirmed this to be the case when it found that an EPA-promulgated CAFO general permit lacked necessary monitoring requirements, in clear violation of the CWA.[12] Further, state permitting agencies have followed EPA's lead, and have overwhelmingly failed to incorporate required monitoring provisions into CAFO NPDES permits, despite the fact that persistent pollution from CAFO sources has demonstrated that facility-level effluent monitoring on or adjacent to CAFO production and land application areas is necessary.[13]

EPA is aware of the flaws in its methodology,[14] yet the Agency nevertheless persists in using it year after year, even though the analysis leads to especially inaccurate results for the CAFO industry. By EPA's own estimate, there are 6,711 permitted CAFOs nationwide.[15] Yet EPA's 2020 concentration analysis relied on a thoroughly anemic dataset comprised of only *sixteen* reporting CAFOs, or 0.2% of all permitted CAFOs.[16] Not only did EPA's analysis exclude review of conventional pollutants like biochemical oxygen demand ("BOD"), total suspended

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[7] EPA, Final Effluent Guidelines Program Plan 14 (Jan. 2021), 5-3 [hereinafter "Final Plan 14"].
[8] *Id.* at 5-7.
[9] Final Plan 14, at 8-3; Preliminary Plan 15, at 5-8.
[10] *See* Petition, at 34-37.
[11] National Pollutant Discharge Elimination System Regulation and Effluent Limitation Guidelines and Standards for Concentrated Animal Feeding Operations, 68 Fed. Reg. 7179, 7217 (Feb. 12, 2003) (codified at 40 C.F.R. pts. 9, 122, 123, 412) [hereinafter 2003 CAFO Rule]; *See also* Petition at 34-37.
[12] *See Food & Water Watch v. USEPA*, 2021 U.S. App. LEXIS 27844, *29-30 (Sept. 16, 2021).
[13] *See* Petition, at 35.
[14] EPA, *Review of Nutrient Discharges* 2-3 (Dec. 2020) (acknowledging that the DMR data source contains data "only for pollutants that a facility is required, by permit, to monitor" and "as a result, reported discharges of nutrients vary significantly within and among industries" based on whether the permitting authority has established monitoring requirements.); GAO, *Water Pollution: EPA Has Improved its Review of Effluent Guidelines but Could Benefit from More Information on Treatment Technologies*, 28 (Sep. 2012) ("[T]he data EPA uses in the screening phase has limitations that may cause the agency to omit industrial categories from further review or regulation.").
[15] EPA, *NPDES CAFO Permitting Status Report* (Jul. 20, 2020).
[16] *Id.* at 5-8.

solids, and fecal coliform, all of which are commonly found in CAFO waste streams,[17] but it also failed to take into account the magnitude of pollutants being discharged.[18] Even if EPA had a representative dataset to analyze—which it doesn't—this approach is still flawed because it prevents the Agency from engaging in a more thorough and holistic analysis of the cumulative impacts of CAFO discharges. As CAFOs tend to be highly concentrated in particular geographic regions, a narrow, pollutant concentration-based review blinds the agency to overall degradation of waterways that can result from numerous and frequent discharges.

FWW believes it is appropriate for EPA to include consideration of pollution loading data to rank and prioritize point source categories for further review and revision, as long as EPA relies on more representative data sources than DMRs for CAFOs.[19] EPA's 2019 nutrient loading analysis announced in Plan 14 relied exclusively on DMR data, and therefore illustrates the problem with this approach. Not only did the Agency rely on a dataset of only 185 facilities, a mere 2.7 percent of all permitted CAFOs, but the majority of facility data came from Montana, a state which does not even require CAFOs to sample effluent or report sampling results in the form of pounds per year on DMRs.[20] Every single Montana facility included in the dataset reported 0 pounds per year of pollutants, skewing the data with "reporting" information that did not appear to be grounded in actual effluent sampling. It is unclear what these operations based their so-called reporting on, but it is clear that EPA's consideration of this information – and only this information – in ruling CAFOs out for further consideration is patently arbitrary. EPA's methodology omitted the vast majority of CAFO pollution and ignored the deficiencies in the tiny dataset considered, yielding artificially low and essentially meaningless industry-wide pollution loads of 44,800 pounds per year of nitrogen, and 2,790 pounds per year of phosphorous.[21]

To highlight the absurdity of the Plan 14 estimates, we compare them below to the nitrogen and phosphorus loads for "permitted feeding space" in the Chesapeake Bay watershed. Regulated agriculture is defined as follows: "Permitted concentrated animal feeding areas including the barn and animal-intensive heavy use areas."[22] Note that this does not include land application areas, manure storage areas, or the deposition of ammonia emissions. Yet even this partial accounting of CAFO loads shows that Plan 14 was terribly inaccurate.

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[17] *Id.* at 5-3.
[18] *Id.* at 5-4.
[19] As announced in Preliminary Plan 15, EPA is also considering whether to incorporate Toxic Release Inventory ("TRI") data into future annual reviews. Preliminary Plan 15, at 5-10. However, this is similarly useless in the CAFO context as the CAFO category is not subject to TRI reporting requirements. *See* 40 C.F.R. § 372.23.
[20] *See* A.R.M. § 17.30.1334 and 17.30.1343 (specifying no monitoring requirements for CAFOs); MT DEQ, *General Permit for Concentrated Animal Feeding Operations Permit No. MTG01000* 16, 25 (Nov. 18, 2018) (providing only that the Department *may*, on a case-by-case basis, require groundwater or additional effluent monitoring as needed).
[21] EPA, *Review of Nutrients in Industrial Wastewater Discharge*, Appendix B, B-3 and B-8 (Dec. 2020).
[22] Chesapeake Assessment Scenario Tool (CAST), Source Data, https://cast.chesapeakebay.net/Home/SourceData.

Table 1: Nitrogen and Phosphorus loads from "permitted feeding space" in the Chesapeake Bay watershed in 2019.[23]

State	Nitrogen Load (pounds per year)	Phosphorus Load (pounds per year)
Delaware	328,379	9,094
District of Columbia	-	-
Maryland	227,454	14,438
New York	153,307	3,982
Pennsylvania	2,437,367	131,213
Virginia	1,037,824	59,262
West Virginia	805	22
TOTAL	4,185,137	218,011
Plan 14 estimate for United States	44,800	2,790

As shown in Table 1, the CAFO loads from many individual states are orders of magnitude larger than what EPA derived as a national estimate. In fact, there are many counties with loads greater than EPA's national estimate: there are 19 counties in the Chesapeake Bay watershed alone with "permitted feeding space" nitrogen loads greater than 44,800 pounds per year, and 14 counties with phosphorus loads greater than 2,790 pounds per year.[24] The nitrogen and phosphorus loads from CAFOs in Lancaster County, Pennsylvania were 1.13 million pounds of nitrogen and 85,000 pounds of phosphorus. Again, this is a single county with a subset of CAFO loads that are orders of magnitudes greater than what EPA estimated for the entire United States.

It is important to note that the CAST estimates for the Chesapeake Bay watershed are developed by the Chesapeake Bay Program, which is effectively an office of the U.S. EPA.[25] The EPA staff writing Plan 14 could have and should have known what their colleagues were estimating for the Chesapeake Bay watershed.

In other words, the data upon which EPA exclusively based its CAFO ELG determination drastically underrepresents CAFO pollution and improperly shields the industry from further, technology-based review. Without a representative dataset, EPA's apparent logic—that ELGs must be adequate if EPA's DMR data indicate that an industry's pollutant concentration levels or pollution load is relatively limited—does not hold.

In sum, EPA's current review and rankings methodology, which relies on woefully incomplete and essentially meaningless CAFO discharge monitoring data, cannot provide a reliable estimate of the industry's polluting impacts. Therefore, regardless of whether the Agency chooses to

[23] 2019 is the most recent year with load estimates from CAST. The results shown here reflect "edge of stream" loads for permitted feeding space in areas defined as "state-area in [Chesapeake Bay watershed only]," for the "2019 Progress" scenario. Results obtained from CAST, Reports, https://cast.chesapeakebay.net/Reports (data obtained on October 1, 2021).
[24] Using the same "2019 progress" scenario described in the preceding footnote, but at the "county-area in CBWS watershed only" level.
[25] Although the Chesapeake Bay Program is formally a "partnership," the "Bay Program leadership" is staffed entirely by U.S. EPA employees. See Chesapeake Bay Program staff, https://www.chesapeakebay.net/who/staff.

focus on pollutant concentrations or total pollution loads, it should not rely on a DMR-based review for industries that are not required to monitor discharges, and should not exclude the CAFO category from further review or revision based on this flawed methodology.

III. Substantial Evidence Demonstrates that Current ELGs are Failing to Control CAFO Pollution and that Better, Affordable Controls are Available

FWW attaches and incorporates by reference its 2017 rulemaking petition urging EPA to revise CAFO regulations ("Petition"), which not only lays out the factual background establishing the well-known water quality impacts of the CAFO industry, but also highlights a number of regulatory inadequacies that allow CAFO pollution to persist, including a comprehensive discussion on how current CAFO ELGs are not adequately protective of water quality.[26] FWW refers the Agency to evidence and arguments presented in the Petition supporting the following revisions:

(1) CAFO ELGs should apply to all permitted CAFOs, not just "large" CAFOs;
(2) EPA must establish application disclosure requirements, Best Available Technology, New Source Performance Standards, and monitoring requirements for additional CAFO pollutants of concern not currently regulated, like metals, pharmaceuticals, chemical cleaning solutions, and synthetic hormones;
(3) CAFO ELG nutrient management plan requirements must prioritize protecting water quality and minimizing runoff instead of optimizing crop yield;
(4) Technical standards must prohibit practices known to harm water quality, like manure storage in inadequately lined lagoons, ventilation of pollutants to nearby waters, application of manure on frozen, saturated, or snow-covered ground, spray irrigation of manure, manure application on steep slopes, and manure storage in exposed stockpiles;
(5) State permitting programs cannot effectively fill the gaps left by the absence of strong national standards, which undermines the Agency's heavy reliance on state-promulgated technical standards and permitting provisions; and
(6) EPA's decades-old assumptions regarding the frequency of storm events are no longer accurate, and thus standards for storage lagoon capacity are no longer based on accurate predictions of storm event frequency or magnitude.[27]

The Petition and its supporting exhibits, which have been in EPA's possession for over four years, clearly establish that current CAFO ELGs are no longer reflective of BAT, and that other, low-cost management practices and control technologies are available to better control CAFO pollution. Based on the substantial body of evidence presented in the Petition, FWW urges EPA to issue updated ELGs as soon as possible for the CAFO point source category.

Thank you for considering our comments.

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[26] Food & Water Watch, et. al., Petition to Revise the Clean Water Act Regulations for Concentrated Animal Feeding Operations (2017) [hereinafter "Petition"]. The comment submission platform does not allow FWW to upload the Petition's supporting exhibits. However, the documents are already in EPA's possession, and FWW hereby incorporates these supporting exhibits by reference.
[27] *See* Petition, at 37-58.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Preliminary Effluent Guidelines Program Plan 15 86 Fed. Reg. 51,155 (Sep. 14, 2021)	Docket ID No. EPA-HQ-OW-2021-0547

COMMENTS OF EARTHJUSTICE, ENVIRONMENTAL INTEGRITY PROJECT, ALASKA COMMUNITY ACTION ON TOXICS, ALIANZA NACIONAL DE CAMPESINAS, AMERICAN SUSTAINABLE BUSINESS COUNCIL, CATSKILL MOUNTAINKEEPER, CENTER FOR BIOLOGICAL DIVERSITY, CENTER FOR FOOD SAFETY, CLEAN AND HEALTHY NEW YORK, COMING CLEAN, FARMWORKER ASSOCIATION OF FLORIDA, JUST GREEN PARTNERSHIP (NY), MOMS FOR A NONTOXIC NEW YORK, SCIENCE AND ENVIRONMENTAL HEALTH NETWORK, and WATERKEEPER ALLIANCE

October 14, 2021

Submitted electronically via regulations.gov

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INTRODUCTION

Earthjustice, Environmental Integrity Project, Alaska Community Action on Toxics, Alianza Nacional de Campesinas, American Sustainable Business Council, Catskill Mountainkeeper, Center for Biological Diversity, Center for Food Safety, Clean and Healthy New York, Coming Clean, Farmworker Association of Florida, Moms for a Nontoxic New York, Just Green Partnership (NY), Science and Environmental Health Network, and Waterkeeper Alliance (collectively, "Commenters") submit these comments on Preliminary Effluent Guidelines Program Plan 15 ("Preliminary Plan 15") (Docket No. EPA-HQ-OW-2021-0547), published by the U.S. Environmental Protection Agency ("EPA" or "Agency") on September 14, 2021. Preliminary Plan 15 summarizes EPA's annual review of effluent limitation guidelines ("ELGs") and pretreatment standards (collectively, "technology-based water pollution control standards") for a variety of industries. These comments concern EPA's failure to fulfill its statutory responsibilities with respect to dozens of outdated and under-protective technology-based water pollution control standards, with a focus on the fertilizer manufacturing industry.

The Clean Water Act ("CWA" or "Act") requires EPA to establish technology-based water pollution control standards that reflect the application of appropriately advanced technology. For certain dangerous and environmentally destructive pollutants, these standards must represent the "gold standard" for controlling water pollution and require polluters to match the performance of the best-performing facility in a particular industry. To ensure that the standards keep pace with technological improvements, Congress directed EPA to review and revise them regularly. Yet for dozens of industries, including the fertilizer manufacturing industry, EPA has allowed these standards to remain stagnant for decades. Given the pace of technological change, decades-old standards almost certainly do not satisfy federal law.

As discussed in more detail below, the fertilizer manufacturing industry is a significant source of harmful water pollution. EPA has not revised ELGs or pretreatment standards for this industry since *at least* the 1980s; standards governing the discharge of pollutants such as ammonia, organic nitrogen, and nitrate date to the mid-1970s, and EPA has *never* developed standards to restrict the industry's discharges of heavy metals. In January 2021, EPA prioritized the fertilizer manufacturing industry for review and revision, because it generates a significant amount of pollution and evidence suggests that available, advanced technology could reduce that pollution. However, in September 2021, EPA reversed its priority decision. In so doing, EPA ignored evidence suggesting the existing ELGs are less protective than federal law requires, did not examine facilities representative of the industry as a whole, did not account for health and environmental harms resulting from the industry's pollution, and disregarded relevant statutory standards. In addition, EPA overlooked evidence that water pollution from fertilizer manufacturing disproportionately harms environmental justice communities, and fertilizer manufacturing and application generate substantial climate, air, and surface water pollution.

Commenters urge EPA to protect public health and the environment by fulfilling its statutory responsibilities with respect to technology-based water pollution control standards and, in particular, by completing an adequate review to determine whether standards governing the fertilizer manufacturing industry require revision.

I. EPA Has a Duty to Regularly Review and, if Appropriate, Revise Water Pollution Control Standards.

The Clean Water Act ("CWA" or "Act") sets a national goal of eliminating water pollution.[1] In furtherance of this goal, the Act requires EPA to promulgate increasingly stringent technology-based water pollution control standards for certain classes and categories of industrial polluters and to revise these regulations to keep pace with advances in technology.[2] By mandating that EPA establish national minimum standards based on what is technologically achievable, the CWA guarantees "that similar point sources with similar characteristics" will achieve similar pollution-reduction targets, regardless of their location across the country.[3]

A. EPA must control pollution from direct dischargers through increasingly stringent effluent limitation guidelines and associated effluent limitations.

For facilities that discharge pollutants directly into surface waters, Congress directed EPA to promulgate pollution limits in the form of national, industry-specific ELGs, which form the basis for specific effluent limitations included in individual wastewater discharge permits.[4] To ensure that the CWA's technology-based standards keep pace with technological improvements—and, thus, continue to push polluters toward the national goal of eliminating water pollution—Congress mandated that EPA revise ELGs "at least annually," if appropriate.[5] EPA must fulfill this duty by reviewing existing ELGs every year and, based on this annual review, deciding whether revisions are appropriate.[6]

EPA's annual decision about the appropriateness of revising ELGs "unambiguous[ly] . . . [is] constrained by the [CWA's] mandate as to what 'such regulations' 'shall' accomplish."[7] With respect to toxic and nonconventional pollutants such as ammonia, organic nitrogen, arsenic, copper, nickel, and zinc,[8] ELGs "shall" identify the degree of pollution reduction achievable

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[1] *See* 33 U.S.C. § 1251(a)(1).
[2] *See* 33 U.S.C. §§ 1311(b)(2), 1314(b), 1316, 1317(b)–(c); *see also Sw. Elec. Power Co. v. EPA*, 920 F.3d 999, 1005 (5th Cir. 2019) (explaining that the CWA is "'technology-forcing,' meaning it seeks to 'press development of new, more efficient and effective [pollution-control] technologies'" (alteration in original) (citing *Nat. Res. Def. Council, Inc. v. EPA*, 822 F.2d 104, 123 (D.C. Cir. 1987))).
[3] *Nat. Res. Def. Council, Inc. v. Train*, 510 F.2d 692, 709–10 (D.C. Cir. 1974) (citation omitted).
[4] *See* 33 U.S.C. § 1314(b) (directing EPA to publish regulations establishing ELGs "[f]or the purpose of adopting or revising effluent limitations"); *id.* § 1311; *see also Tex. Oil & Gas Ass'n v. EPA*, 161 F.3d 923, 927 (5th Cir. 1998) (explaining that Congress designed the CWA to eliminate water pollution "through a system of effluent limitation guidelines").
[5] 33 U.S.C. § 1314(b).
[6] *See Defs. of Wildlife v. Jackson*, 284 F.R.D. 1, 4 (D.D.C. 2012) ("EPA has an obligation to review effluent guidelines [annually] . . . *for possible revision*[.]") (quoting *Our Children's Earth Found. v. EPA*, 527 F.3d 842, 849 (9th Cir. 2008)); *see also Env't Def. Fund v. Thomas*, 870 F.2d 892, 896 (2d Cir. 1989) (concluding, under an analogous review-and-revise provision of the Clean Air Act, that EPA has a nondiscretionary "duty to make *some* decision" regarding revision).
[7] *Our Children's Earth Found.*, 527 F.3d at 851.
[8] *See* 40 C.F.R. § 401.15 (identifying arsenic, copper, nickel, and zinc as toxic pollutants); 33 U.S.C. § 1314(a)(4) (listing conventional pollutants, which do not include ammonia or total nitrogen).

through application of the "best available technology" or "BAT."[9] BAT represents "the gold standard for controlling water pollution from existing sources," and it must be based, at a minimum, "on the performance of the single best-performing plant in an industrial field."[10] "In setting BAT, EPA uses not the average plant, but the optimally operating plant, the pilot plant which acts as a beacon to show what is possible."[11]

B. EPA must control pollution from indirect dischargers by promulgating pretreatment standards.

Unlike direct dischargers, *indirect* dischargers send their wastewater to publicly owned treatment works ("POTWs"), which collect and treat wastewater from various sources before discharging it into surface waters. If indirect dischargers fail to apply appropriately advanced wastewater treatment technology, POTWs may be unable to treat their wastewater, resulting in excess discharge of pollutants.[12] EPA repeatedly has acknowledged that some POTWs are unable to treat ammonia, for example.[13]

To limit pollution from indirect dischargers, Congress directed EPA to publish guidelines that control and prevent the discharge of "any pollutant which interferes with, passes through, or otherwise is incompatible with [POTWs]."[14] EPA must review these pretreatment guidelines "at least annually thereafter and, if appropriate, revise guidelines for pretreatment of pollutants which [it] determines are not susceptible to treatment by publicly owned treatment works."[15] In addition, Congress mandated that EPA establish pretreatment standards applicable to particular industries and revise those standards "from time to time," keeping pace with advancing technology.[16] (For simplicity and convenience, Commenters refer to pretreatment guidelines and pretreatment standards collectively as "pretreatment standards.") Like ELGs, technology-based pretreatment standards "ensure that industrial facilities with similar characteristics will, at a minimum, meet similar . . . pretreatment standards representing the performance of the 'best'

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[9] 33 U.S.C. § 1314(b)(2)(B); *see Sw. Elec. Power Co.*, 920 F.3d at 1006 (explaining that existing, direct dischargers are subject to BAT); *see also* Preliminary Effluent Guidelines Program Plan for 2004/2005, 68 Fed. Reg. 75,515-01, 75,518 (Dec. 31, 2003) (stating that EPA "must consider" statutory factors relating to the identification of BAT "when deciding whether to . . . revise effluent guidelines").

[10] *Sw. Elec. Power Co.*, 920 F.3d at 1003, 1006 (citing *Chem. Mfrs. Ass'n v. EPA*, 870 F.2d 177, 226 (5th Cir. 1989)).

[11] *Kennecott v. EPA*, 780 F.2d 445, 448 (4th Cir. 1985).

[12] *See Chem. Mfrs. Ass'n*, 870 F.2d at 197.

[13] *See, e.g.*, Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards for the Iron and Steel Manufacturing Point Source Category, 67 Fed. Reg. 64,216, 64,227 (Oct. 16, 2002) (explaining that some POTWs "do not have nitrification capability" necessary to treat ammonia); Nonferrous Metals Manufacturing Point Source Category; Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards, 49 Fed. Reg. 8,742, 8,766 (Mar. 8, 1984) ("It is necessary to promulgate [pretreatments standards] to prevent pass-through of . . . ammonia.").

[14] 33 U.S.C. § 1314(g)(1).

[15] *Id.*

[16] *Id.* § 1317(b)(1)–(2).

pollution control technologies, regardless of their location or the nature of . . . [the] POTW into which they discharge."[17]

II. EPA Has Failed to Review and Revise Outdated and Under-Protective ELGs and Pretreatment Standards for a Variety of Polluting Industries.

EPA has not fulfilled its statutory responsibilities to review and revise dozens of outdated and under-protective technology-based water pollution control standards governing a wide range of industries. Even a cursory review of EPA's existing ELGs reveals that the Agency has fallen far short of its review-and-revision mandates. As EPA is aware,[18] approximately two-thirds of EPA's existing ELGs have remained unchanged for over 30 years, and 17 have been allowed to stagnate since the 1970s.

Technology that is more than 45 years old—or even 30, 15, or 10 years old—is almost indisputably out of date. Congress required EPA to review and revise existing technology-based standards at least annually—and not, for example, only once every 10 or 20 years—precisely because technological improvements occur regularly and rapidly. EPA must keep pace with these technological improvements if it is to protect human health and make progress toward our national goal of eliminating water pollution. Instead of fulfilling its statutory responsibilities, however, EPA has neglected standards for a range of industries—including seafood processing, dairy products processing, canned and preserved fruits and vegetables processing, grain mills, sugar processing, fertilizer manufacturing (discussed below), concentrated aquatic animal production, pesticide chemicals, and concentrated animal feeding operations—for at least 13 and, more often, for as many as 35 or 46 years. Indeed, as illustrated below, some of these standards have not been updated for nearly a half century.

Table. Selected ELGs, Sorted from Oldest to Newest

ELG (Industrial Category)	40 CFR Part	Year of Promulgation	Year of Last Revision	Age of ELG (Years)	If Applicable, Reason for Revision
Canned and Preserved Seafood (Seafood Processing)	408	1974	1975	46	Amended to include pretreatment standards.
Dairy Products Processing	405	1974	1975	46	Amended to include pretreatment standards.

[17] Preliminary Plan 15 at 2-1.
[18] *See* Letter from Eric Schaeffer, Exec. Dir. & Sylvia Lam, Attorney, Env't Integrity Project, to Michael Regan, Adm'r, EPA (Sept. 22, 2021), https://environmentalintegrity.org/wp-content/uploads/2021/09/2021.09.22-EPA-ELG-letter-FINAL.pdf.

ELG (Industrial Category)	40 CFR Part	Year of Promulgation	Year of Last Revision	Age of ELG (Years)	If Applicable, Reason for Revision
Canned and Preserved Fruits and Vegetable Processing*	407	1974	1976	45	Amended to revoke certain limitations following judicial challenge.
Grain Mills	406	1974	1986	35	Amended to comply with new guidelines following judicial challenge.
Sugar Processing*	409	1974	1986	35	Amended to comply with new guidelines following judicial challenge.
Fertilizer Manufacturing	418	1974	1986	35	Amended standards governing discharges of conventional pollutants, but did *not* amend BAT standards governing toxic and nonconventional pollutants.
Concentrated Aquatic Animal Production	451	2004	never revised	17	
Pesticide Chemicals	455	1978	2007	14	Amended to "introduce greater flexibility in the use of approved [testing] methods."
Concentrated Animal Feeding Operations (CAFOs)	412	1974	2008	13	Amended following judicial challenge.

Not only does the extreme old age of most of these standards almost certainly indicate that they no longer provide the mandated level of protection, but EPA also possesses specific information indicating that relevant technology has improved over time. For instance, more than 40 percent of our rivers and streams are impaired by phosphorus and nitrogen pollution,[19] including nitrogen compounds such as ammonia and nitrate that impair waterbodies by feeding algal growth and depressing oxygen levels. Some wastewater systems designed to remove ammonia pollution generate nitrates as a byproduct and, thus, fail to control nitrogen pollution effectively. As a result, multiple states already require industrial polluters to install advanced "denitrification systems," which reduce nitrate discharges. In light of the existence and widespread adoption of this advanced technology, ELGs and pretreatment standards that reflect older, less effective technology almost certainly must be revised. To comply with the CWA and ensure that its decisions about the appropriateness of revision accord with statutory standards, EPA must incorporate information about the availability of advanced technology into its annual reviews.

III. Water Pollution from Fertilizer Manufacturing Must Be Reduced to Meet the Goals of the Clean Water Act.

EPA has promulgated technology-based water pollution control standards for three broad categories of fertilizer manufacturing plants: (1) plants that manufacture nitrogen fertilizer ingredients; (2) plants that manufacture phosphate fertilizer ingredients; and (3) plants that mix nitrogen and phosphate ingredients with other chemicals to produce finished fertilizer products.[20] These standards include separate ELGs and pretreatment standards for seven subcategories of facilities: phosphate, ammonia, urea, ammonium nitrate, nitric acid, ammonium sulfate, and mixed and blend fertilizer. Although nitrogen and phosphate fertilizer ingredients are usually manufactured at separate facilities, facilities manufacturing nitrogen fertilizer ingredients often produce multiple types of nitrogen compounds and, thus, are subject to multiple ELGs and pretreatment standards. For example, Cherokee Nitrogen Company in Cherokee, Alabama operates a nitrogen fertilizer manufacturing facility consisting of an ammonia plant, a urea plant, an ammonium nitrate plant, and two nitric acid plants.[21]

In Effluent Guidelines Program Plan 14 ("Program Plan 14"), issued in January 2021, EPA announced that it was "prioritizing" the fertilizer manufacturing industry for further review, based on its finding that at least 25 percent of fertilizer manufacturing facilities discharge concentrations of total nitrogen above those "commonly achieved" by other industrial facilities through the application of available treatment technology.[22] This priority decision was consistent with EPA's statutory obligation to ensure that ELGs governing the discharge of nitrogen

[19] *See* EPA, *National Water Quality Inventory: Report to Congress* (Aug. 2017) at 7, https://www.epa.gov/sites/default/files/2017-12/documents/305brtc_finalowow_08302017.pdf.
[20] *See* 40 C.F.R. pt. 418.
[21] *See* Letter from Eric Sanderson, Ala. Dep't Env't Mgmt. to Don Philips, General Manager, Cherokee Nitrogen Co. re Permit NPDES Permit No. AL0000418 (issued Mar. 20, 2012) at 1-2 (Dec. 9, 2011).
[22] Program Plan 14 at 5-8.

compounds, as well as other toxic and nonconventional pollutants, reflect BAT, even if that technology is not yet in use in the relevant industry.[23] However, in Preliminary Plan 15, EPA abruptly reversed its decision to review the fertilizer manufacturing industry, based on its assertion that the industry "did not rank highly in EPA's 2020 analyses of pollutant discharges."[24]

EPA's reversal decision is inconsistent with the Agency's obligations under the CWA. *First*, EPA did not even attempt to justify this decision by asserting that the existing, 47-year-old ELGs governing discharges of ammonia, nitrates, and organic nitrogen from the fertilizer manufacturing industry constitute appropriately advanced technology—nor could EPA have done so, given the Agency's prior finding that the existing ELGs fail to mandate levels of pollution reduction commonly achieved by other industrial facilities. *Second*, EPA arbitrarily based its decision on a cursory analysis of fertilizer manufacturing facilities that are not representative of the industry as a whole. *Third*, EPA did not appropriately weigh the health and environmental harms caused by water pollution from fertilizer manufacturing. *Fourth,* EPA's 2020 analysis contravened the Clean Water Act's provisions for revision of ELGs. In short, EPA's 2020 analysis, as described in Preliminary Plan 15, did not provide a sufficient basis for EPA to reverse its prior decision to review the fertilizer manufacturing category.

EPA's existing technology-based water pollution control standards for the fertilizer manufacturing industry fail to protect human health and the environment. Although the existing standards impose *some* limits on the discharge of phosphorus and nitrogen compounds, the fertilizer manufacturing industry remains a leading source of harmful nutrient pollution. In addition, the existing standards do not place *any* limits on the discharge of heavy metals such as lead, mercury, cadmium, and arsenic, exposure to which can cause kidney damage and certain cancers, even though EPA has known since the 1970s that fertilizer manufacturing facilities discharge these pollutants.[25] EPA's latest review of the fertilizer manufacturing industry failed to account for these shortcomings in the existing standards, as well as other critical facts indicating that revision of water pollution control standards for the fertilizer manufacturing industry is necessary and overdue.

A. Fertilizer manufacturing releases significant quantities of nutrient pollution, which threatens human health and the environment.

As explained above, EPA's January 2021 decision to prioritize review of the fertilizer manufacturing industry reflected the Agency's recognition that the industry as a whole

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[23] *See Kennecott*, 780 F2d at 453 (explaining that "Congress . . . asked EPA to survey related industries and current research to find technologies which might be used to decrease the discharge of pollutants," because "[p]rogress would be slowed if EPA were invariably limited to treatment schemes already in force at the plants which are the subject of the rulemaking").

[24] Preliminary Plan 15 at 5-1.

[25] *See* EPA, *Development Document for Effluent Limitation Guidelines and New Source Performance Standards for the Basic Fertilizer Chemicals Segment of the Fertilizer Manufacturing Point Source Category* at 69-81 (Mar. 1974).

discharges significant quantities of nutrient pollution, and many facilities within the industry discharge relatively high concentrations of nitrogen compounds.[26] Indeed, in 2019, facilities likely to be categorized as fertilizer manufacturing facilities together discharged about 2,186,549 pounds ("lbs") of nitrogen compounds[27] and 98,545 lbs of phosphorus compounds.[28] And, although EPA found that fertilizer manufacturing facilities *generally* discharge relatively high concentrations of nitrogen compounds, it also acknowledged that the concentration of pollutants in fertilizer manufacturing facilities' wastewater varies widely; 25 percent of facilities discharge total nitrogen at concentrations above 37.5 milligrams per liter ("mg/L"), whereas another 25 percent of facilities discharge nitrogen compounds at concentrations below 1.42 mg/L.[29] This variation in pollution concentrations suggests that EPA's technology-based water pollution control standards for fertilizer manufacturing facilities are more lax than is technologically or economically necessary—and, as a result, those standards are failing to drive necessary reductions in water pollution.

Nutrient discharges from fertilizer manufacturing facilities pose serious threats to human health. As EPA has explained, "[e]xcessive nitrogen and phosphorus in surface water can lead to a variety of problems, including eutrophication and harmful algal blooms, with impacts on drinking water, recreation, and aquatic life."[30] Fertilizer manufacturing facilities discharge nitrates, exposure to which in drinking water may cause colorectal cancer and thyroid disease.[31] Fetuses and infants are especially at risk, as nitrates are associated with birth defects and methemoglobinemia, or "blue baby syndrome," in infants under six months of age.[32] Exposure to nitrates during pregnancy has also been linked to spontaneous abortion, fetal death, prematurity, intrauterine growth retardation, low birth weight, congenital malformations, and neonatal death.[33]

Nitrogen and phosphorus pollution from fertilizer manufacturing facilities contribute to excessive fertilization of water, causing cyanobacterial blooms—also known as blue-green algae blooms—that adversely affect humans, aquatic life, and animals. Cyanobacterial blooms produce

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[26] *See* Program Plan 14 at 5-8.

[27] Specifically, the industry discharged 53,273 lbs of ammonia; 2,563,761 lbs of ammonia as N; 1,055,356 lbs of nitrate; 1,131,193 lbs of total kjeldahl nitrogen; 1,082,089 lbs of organic nitrogen; 839,056 lbs of nitrogen; 165,101 lbs of urea; and 156,940 lbs of inorganic nitrogen. This data is from EPA's Water Pollution Search. We filtered DMR data from 2019 for discharges of all pollutants from Point Source Category: 418 – Fertilizer Manufacturing (see discussion below on accuracy of using EPA's PSC filter). From these search results, we pulled data from the table on Top Pollutants by Pounds. Total nitrogen lbs were determined by summing total kjeldahl nitrogen, nitrate, and nitrite, the formula EPA uses to calculate total nitrogen in its Loading Tool. *See Nutrient Aggregation*, EPA, https://echo.epa.gov/trends/loading-tool/resources/nutrient-aggregation.

[28] This data is from the same search described in note 27. Total phosphorus lbs were determined by summing amounts of all phosphorus-related pollutants.

[29] *See* EPA, *EPA's Review of Nutrients in Industrial Wastewater Discharge* at B-1 (Dec. 2020).

[30] Program Plan 14 at 5-2.

[31] *See* Mary H. Ward et al., *Drinking Water Nitrate and Human Health: An Updated Review*, 15 Int'l J. Env't Rsch. Pub. Health 1 (2018).

[32] *Id.* at 7.

[33] *Id.*

health-harming cyanotoxins.[34] Among humans, exposure to cyanotoxins in surface water can cause mild skin rash, hay fever-like symptoms, and respiratory and gastrointestinal distress.[35] Exposure to cyanotoxins in drinking water can cause liver and kidney damage.[36] Dogs, livestock, and wildlife exposed to cyanotoxins can become ill and experience symptoms such as difficulty breathing, vomiting, diarrhea, and death.[37] In addition, algal blooms contribute to unsightly, murky water that blocks essential light from reaching plants beneath the water's surface.[38] They also deplete oxygen levels in waterbodies, a phenomenon called hypoxia, which leads to increased mortality among local fish, shellfish, invertebrate, and plant populations.[39] Underscoring the widespread harm that algal blooms cause, in September 2021, the EPA Inspector General released a report concluding that EPA must do more to address algal blooms vigorously and completely.[40]

B. Fertilizer manufacturing releases significant quantities of other toxic pollutants, which further threaten human health and the environment.

In addition to nutrient pollution—which *is* regulated under the existing ELGs, albeit inadequately—fertilizer manufacturing plants also discharge significant quantities of other pollutants, including toxic pollutants *not* regulated under the current ELGs and pretreatment standards. In 2019, fertilizer manufacturing plants discharged 76,092 lbs of copper; 3,946 lbs of sulfide; 1,505 lbs of chlorine; 80,518 lbs of zinc; 1,944 lbs of selenium; 8,199 lbs of arsenic; 66,984 lbs of vanadium; 7,416 lbs of cobalt; 280,757 lbs of chloride; 49,180 lbs of nickel; 3,831 lbs of lead; 621,712 lbs of sulfate; 82,932 lbs of methanol; 443,085 lbs of manganese; and 3,874,960 lbs of barium.[41] In its previous cross-category concentration analysis of pollutant discharges, EPA found that fertilizer manufacturing ranks among the top five highest industries for discharges of cadmium, fluoride, chromium, cyanide, and lead.[42] Although EPA acknowledged in 1974 that the fertilizer manufacturing industry discharges these dangerous pollutants, it failed to adopt ELGs governing them at the time.[43] Nearly 50 years later, the Agency still has taken no action to correct that failure.

Discharges of these toxic pollutants can cause serious harm, even in relatively small quantities. For instance, the Maximum Contaminant Level Goal ("MCLG") indicates the level

[34] *See Causes of CyanoHABs*, EPA, https://www.epa.gov/cyanohabs/causes-cyanohabs#how1.
[35] *See Health Effects from Cyanotoxins*, EPA, https://www.epa.gov/cyanohabs/health-effects-cyanotoxins.
[36] *Id.*
[37] *Id.*
[38] *Id.*
[39] *Id.*
[40] *See* Office of Inspector General, EPA*, EPA Needs an Agencywide Strategic Action Plan to Address Harmful Algal Blooms* (2021), https://www.epa.gov/system/files/documents/2021-09/_epaoig_20210929-21-e-0264_glance.pdf.
[41] Amounts from TRI (where available) and DMR data retrieved using EPA's Water Pollution Search, filtering for 2019 data for discharges of all pollutants from Point Source Category: 418 – Fertilizer Manufacturing.
[42] *See* Cross-Category Concentration Analysis, EPA-HQ-OW-2018-0618-0665, https://www.regulations.gov/document/EPA-HQ-OW-2018-0618-0665.
[43] *See* EPA, *Development Document for Effluent Limitation Guidelines and New Source Performance Standards for the Basic Fertilizer Chemicals Segment of the Fertilizer Manufacturing Point Source Category* (Mar. 1974).

below which a contaminant in drinking water poses no known or expected risk to health. The MCLGs for arsenic and lead are *zero*, and the MCLGs for selenium and barium are just 0.05 mg/L and 2 mg/L, respectively.[44] Lead, mercury, cadmium, and arsenic are associated with health impacts such as kidney damage, bone damage, fractures, neurotoxic effects, and skin and other cancers.[45] Ingestion of vanadium, zinc, selenium, and copper can cause nausea and vomiting and lead to anemia, hair loss, nail brittleness, neurological abnormalities, liver and kidney damage, and death.[46] Exposure to manganese is linked to impacts to the nervous system, including slowed and clumsy movements.[47] High amounts of chloride are toxic to fish, aquatic bugs, and amphibians. Even low levels of chloride can negatively affect fish and insect community structure, diversity, and productivity and harm aquatic vegetation.[48]

C. EPA's most recent review was insufficient to determine whether revision of the fertilizer manufacturing industry's existing ELGs and pretreatment standards is appropriate.

EPA's most recent review of the fertilizer manufacturing industry did not provide a sufficient basis for the Agency's reversal of its January 2021 decision to prioritize this industry for further review. As explained above, the CWA requires EPA to regularly review and, if appropriate, revise ELGs and pretreatment standards.[49] EPA's decision about the appropriateness of revision is "constrained by the [CWA's] mandate as to what [ELGs and pretreatment standards] 'shall' accomplish,"[50] and the CWA makes clear that ELGs and pretreatment standards must drive pollution reductions by reflecting appropriately advanced technology.[51] Thus, EPA's annual review must evaluate whether existing ELGs and pretreatment standards do,

[44] *See National Primary Drinking Water Regulations*, EPA, https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations#one.
[45] *See* Lars Jarup, *Hazards of Heavy Metal Contamination*, 68 British Med. Bull. 167 (2003).
[46] *See* Agency for Toxic Substances & Disease Registry, Vanadium CAS # 7440-62-2 Fact Sheet, https://www.atsdr.cdc.gov/toxfaqs/tfacts58.pdf; Agency for Toxic Substances & Disease Registry, Zinc CAS # 7440-66-6 Fact Sheet, https://www.atsdr.cdc.gov/toxfaqs/tfacts60.pdf; Agency for Toxic Substances & Disease Registry, Copper CAS # 7440-50-8 Fact Sheet, https://www.atsdr.cdc.gov/toxfaqs/tfacts132.pdf; Agency for Toxic Substances & Disease Registry, Selenium CAS # 7782-49-2 Fact Sheet, https://www.atsdr.cdc.gov/toxfaqs/tfacts92.pdf.
[47] *See* Agency for Toxic Substances & Disease Registry, Manganese CAS # 7439-96-5 Fact Sheet, https://www.atsdr.cdc.gov/toxfaqs/tfacts151.pdf.
[48] *See Chloride 101*, Minn. Pollution Control Agency, https://www.pca.state.mn.us/water/chloride-101#:~:text=Chloride%20from%20de%2Dicing%20salt,pollute%20five%20gallons%20of%20water.
[49] *See* 33 U.S.C. §§ 1314(b), 1314(g)(1), 1317(b)(2).
[50] *Our Children's Earth Found.*, 527 F.3d at 851.
[51] *See, e.g.*, *Sw. Elec. Power Co.*, 920 F.3d at 1003, 1006 (explaining that, under the CWA, ELGs for toxic and nonconventional pollutants must identify the degree of pollution reduction achievable through application of BAT); Preliminary Plan 15 at 2-1 (stating that pretreatment standards require industrial facilities to match "the performance of the 'best' pollution control technologies").

in fact, reflect appropriately advanced technology.[52] EPA's most recent review of the fertilizer manufacturing industry failed to meet this standard.

In its most recent review, EPA attempted to identify industries with relatively high wastewater pollutant concentrations by comparing concentrations across industries. EPA relied on 2019 Discharge Monitoring Report ("DMR") data for information about pollutant concentrations, where available, and for information to calculate pollutant concentrations, where concentration information was not available.[53] EPA used Standard Industrial Classification ("SIC") and North American Industrial Classification System ("NAICS") codes to attribute facility-level pollutant concentrations to regulated industries.[54] Within each industry, EPA identified the median of the facility-level average monthly concentration values for each pollutant; ranked the median concentrations from highest to lowest; and used two approaches to identify the number of top-ranking pollutants within each industry.[55] *First*, EPA determined the number of pollutants within each industry for which the median concentration was among the five highest median concentrations for that pollutant across all industries.[56] *Second*, EPA determined the number of pollutants within each industry for which the median concentration was among the top 25 percent of median concentrations for that pollutant across all industries.[57] For each industry, EPA then divided the number of top-ranked pollutants by the total number of pollutants monitored within that industry.[58] EPA selected the top five industries based on each approach for further consideration.[59] According to the top-five approach, the fertilizer manufacturing industry ranked 33rd out of 55 industries; according to the top 25 percent approach, the industry ranked 23rd.[60]

EPA's review was inadequate to determine the appropriateness of revising the fertilizer manufacturing industry's existing ELGs and pretreatment standards for at least four reasons: (1) EPA ignored indications that the industry's existing ELGs are outdated and under-protective; (2) EPA looked only at a relatively small number of facilities that do not fully represent the industry; (3) EPA did not adequately consider the health and environmental harms caused by water pollution from fertilizer manufacturing; and (4) EPA's review contravened the Clean Water Act's provisions for revision of ELGs.

1. **Publicly available information indicates that the existing ELGs are outdated and under-protective.**

EPA has not revised ELGs governing the fertilizer manufacturing industry's discharge of toxic and nonconventional pollutants such as ammonia, organic nitrogen, and nitrate since it first promulgated those ELGs in 1974 and 1975. As a result, the ELGs now reflect technology that is

[52] *See, e.g.*, 68 Fed. Reg. at 75,518 (explaining that EPA "must consider" statutory factors relating to the identification of BAT "when deciding whether to . . . revise effluent guidelines").
[53] *See* Preliminary Plan 15 at 5-2.
[54] *Id.* at 5-3.
[55] *Id.*
[56] *Id.* at 5-4.
[57] *Id.*
[58] *Id.*
[59] *Id.*
[60] *Id.* at 5-7–5-9.

over 45 years old. It is impossible to ignore the extraordinary technological change that has occurred over the last half-century, and in light of this change, it is difficult to credit EPA's apparent conclusion that the existing ELGs continue to reflect BAT. Not only did EPA fail to recognize that the age of the ELGs renders them almost indisputably out of date, however, but the Agency also ignored evidence that the ELGs, in fact, are under-protective, including evidence that: (1) the current ELGs do not restrict the discharge of certain dangerous water pollutants generated by fertilizer manufacturing facilities; (2) advanced technology likely is available and economically achievable for the fertilizer manufacturing industry; and (3) the amount of pollution generated by the industry as a whole has not increased proportionally to fertilizer production, and some fertilizer manufacturing facilities already are exceeding the level of performance required under the current ELGs, indicating that revision is necessary and overdue.

First, EPA acknowledged in 1974 that fertilizer manufacturing facilities discharge pollutants not limited by the existing ELGs, including total chromium, zinc, iron, nickel, cadmium, vanadium, arsenic, uranium, and radium 226.[61] As discussed above, these pollutants pose numerous threats to human health. Nonetheless, in 1974, EPA declined to establish ELGs for these pollutants—which the Agency termed "secondary parameters"—because, it claimed, "treatment of the primary parameters will effect removal of these secondary parameters" and "insufficient data exists to establish effluent limitations [for the secondary parameters]."[62] EPA's September 2021 reversal decision did not address whether the existing ELGs, in fact, have effected removal of dangerous heavy metals from fertilizer manufacturing facilities' wastewater. Neither did it resolve whether sufficient data are now available to establish new ELGs governing the discharge of these pollutants.

Second, the fertilizer manufacturing industry has experienced massive growth over the past few decades, and investors have injected billions of dollars into the industry.[63] The vast majority of ammonia produced in the United States is used to make fertilizer, and between 2007 and 2019, ammonia production increased from 8.3 million lbs annually to 13.5 million lbs

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[61] EPA, *Development Document for Effluent Limitation Guidelines and New Source Performance Standards for the Basic Fertilizer Chemicals Segment of the Fertilizer Manufacturing Point Source Category* at 8–82 (Mar. 1974).
[62] *Id.*
[63] *See, e.g.*, Mike Coppock, *Majority of Work on $1.3B Expansion of Koch Fertilizer Plant in Enid to be Completed in 2017*, Tulsa World (Apr 12, 2017), https://tulsaworld.com/business/majority-of-work-on-1-3b-expansion-of-koch-fertilizer-plant-in-enid-to-be/article_ac85ab42-5eca-5dd7-9841-4382f9fd1140.html (Koch spending over $1.3 billion on expanding Enid Nitrogen facility); Enid News & Eagle, *UPDATED: Koch Fertilizer to invest $150 Million in Enid Expansion* (Mar. 10. 2021), https://www.enidnews.com/news/ag_energy/updated-koch-fertilizer-to-invest-150-million-in-enid-expansion/article_a8f2620c-81f0-11eb-a787-2fb75d82bb0d.html (Koch Fertilizer investing $150 million at Enid nitrogen facility); WQAD, *Massive New Iowa Fertilizer Company Plant Opens*, KCRG (Apr. 19, 2017), https://www.kcrg.com/content/news/Massive-new-Iowa-Fetilizer-Company-plant-opens-419904143.html (over $3 billion spent on new Iowa Fertilizer Company facility).

annually.[64] Currently, at least 25 nitrogen fertilizer manufacturing facilities are planned for construction or expansion.[65] This rapid growth and substantial investment suggest that advanced technology likely is available and economically achievable for the fertilizer manufacturing industry, warranting the revision of the existing ELGs.

Third, as the fertilizer manufacturing industry has grown, nutrient pollution has not increased proportionally to fertilizer production. As explained above, ammonia production increased from 8.3 million tons in 2007 to 13.5 million tons in 2019. During the same period, the fertilizer manufacturing industry's aggregated nitrogen discharges increased from about 4 million lbs to 5.8 million lbs.[66] In other words, ammonia production grew by 63 percent, while aggregated nitrogen pollution increased by only 45 percent. This decrease in pollution relative to production indicates that advanced pollution control technology is likely available and already in use.

Indeed, at least one fertilizer manufacturing facility *is* beating the existing ELGs, which suggests that those ELGs no longer reflect BAT. Koch Fertilizer Beatrice, a nitrogen fertilizer manufacturing facility located in Nebraska that produces anhydrous ammonia and urea ammonium nitrate solution, is discharging at rates far below its permit limits. Its permit incorporates technology-based standards, consistent with EPA's existing ELGs, for the spring and winter seasons and Nebraska's more stringent water-quality based standard for the summer season. The 2021 permit fact sheet for this facility notes that the facility is well equipped to comply with even the more stringent water-quality based summer ammonia limit, stating: "The [Nebraska Department of Environment and Energy] does not anticipate that the facility will ever violate the water-quality based concentration limits for ammonia."[67]

The most recent DMR data available confirms that this facility is discharging well below its permit limits. Compared to a spring ammonia permit limit of 170 kilograms per day ("kg/day") (mass-based monthly average), the facility this year achieved averages of 13.69 kg/day (March), 8.36 kg/day (April), and 7.65 kg/day (May). Compared to a summer ammonia permit limit of 88.90 kg/day, the facility has achieved 9.14 kg/day (June). Compared to a winter ammonia permit limit of 80 kg/day, the facility has achieved 17.46 kg/day (January) and 18.4 kg/day (February). In addition, in 2020, Koch Fertilizer announced it would be investing $90

[64] *See* U.S. Geological Surv., Mineral Commodity Summary for Nitrogen (Fixed) – Ammonia (2008), https://s3-us-west-2.amazonaws.com/prd-wret/assets/palladium/production/mineral-pubs/nitrogen/mcs-2008-nitro.pdf; *see also* U.S. Geological Surv., Mineral Commodity Summary for Nitrogen (Fixed) – Ammonia (2020), https://pubs.usgs.gov/periodicals/mcs2020/mcs2020-nitrogen.pdf.

[65] *See Tracking Oil and Gas Infrastructure Emissions*, Env't Integrity Project, https://environmentalintegrity.org/oil-gas-infrastructure-emissions/.

[66] Data retrieved from EPA's Water Pollution Search filtering for DMR data on discharges from the nitrogen pollutant category for all point sources for the relevant years. We then looked up discharge data for SIC Code 2873 Nitrogen Fertilizers in the Top SIC Discharges table.

[67] Neb. Dep't of Env't & Energy, NPDES Permit Mod. No. NE0000060 Fact Sheet at 3.

million to improve "reliability and environmental and safety performance," suggesting that even more advanced technology may be available.[68]

2. EPA's 2020 review was inadequate because it did not consider a representative sample of facilities and considered facilities not subject to EPA's existing ELGs and pretreatment standards.

EPA's review of the fertilizer manufacturing industry was inadequate because it did not include a representative sample of facilities subject to EPA's existing ELGs and pretreatment standards. Specifically, EPA considered pollutant discharge data from only 35 facilities,[69] which it assumed—but did not confirm—are subject to the existing ELGs and pretreatment standards. EPA selected these facilities based on their SIC and NAICS codes,[70] either of which may be used to classify an industrial facility based on its primary activity. However, EPA's process was flawed for at least two reasons: (1) EPA did not confirm that the subset of facilities it considered accurately represent the industry as a whole, and (2) EPA failed to consider *any* facility that manufactures solely phosphate fertilizer ingredients.

First, EPA's analysis considered only 35 facilities with relevant NAICS and SIC codes.[71] By contrast, EPA's prior nutrient analysis described in Program Plan 14 analyzed 123 facilities.[72] Although the facilities EPA considered *may* adequately represent the fertilizer manufacturing industry, EPA provided no evidence to support this conclusion. It is possible that EPA intentionally or unintentionally included facilities with relatively low discharges while excluding facilities with relatively high discharges and, thus, distorted its review.

Even if the 35 facilities considered by EPA were representative of facilities *with relevant SIC and NAICS codes*, those codes do not necessarily correspond to facilities subject to EPA's

[68] Koch Fertilizer, *KF to Invest $90 Million in Beatrice Nitrogen Plant* (Nov, 10, 2020), https://kochfertilizer.com/newsroom/KF-to-Invest-90-Million-in-Beatrice-Nitrogen-Plant_2503.aspx.
[69] *See* Program Plan 15 at 5-8.
[70] *Id.* at 5-3 (explaining that EPA "used established crosswalks maintained in the Loading Tool documentation to relate individual facility and reported pollutants to the most appropriate [point source category], commonly based on the facility's primary reported Standard Industrial Classification (SIC) or North American Industry Classification System (NAICS) code").
[71] EPA's Water Pollution Search tool identifies 459 facilities as likely to be part of the fertilizer manufacturing point source category based on NAICS and SIC codes and 2021 data. Of these, 84 facilities fall within SIC code 2873 (Nitrogen Fertilizers) and 375 facilities fall within SIC code 2875 (Fertilizer, Mixing Only). And 21 are tagged as NAICS code 325311 (Nitrogenous Fertilizer Manufacturing) and 62 are tagged as NAICS code 325314 (Fertilizer (Mixing Only) Manufacturing). EPA's database furthermore contains 30 facilities with SIC code 2874 (Phosphatic Fertilizers) and 16 facilities with NAICS code 325312 (Phosphatic Fertilizer Manufacturing). This suggests there are between 37 to 114 facilities with NAICS and/or SIC codes indicating they manufacture phosphate or nitrogen fertilizer. EPA's analysis considered only 35 facilities. Note there may be overlap in facilities tagged with the SIC and NAICS codes for nitrogen and phosphate fertilizer manufacturing. Other discrepancies also call into question the reliability of the data EPA used for its analysis. For example, searching on EPA's ECHO Facility Search tool brings up just 204 facilities likely to be in the fertilizer manufacturing industry—much fewer than the 459 returned using the same search parameters in the Water Pollution Search Tool. It is unclear why this is the case.
[72] *See* EPA, *Review of Nutrients in Industrials Wastewater Discharge* at B-1 (Dec. 2020).

existing ELGs for the fertilizer manufacturing industry, which are codified at 40 C.F.R. Part 418 ("Part 418 regulations"). In fact, several facilities included in EPA's analysis are *not* subject to the fertilizer manufacturing ELGs, according to their permits.[73] Moreover, numerous other facilities that *are* subject to the fertilizer manufacturing ELGs were excluded from EPA's analysis.[74] Since EPA did not confirm that the 35 facilities it considered were, in fact, subject to the fertilizer manufacturing ELGs, it is unclear whether EPA's conclusion about those 35 facilities has any relevance to facilities that are subject to the fertilizer manufacturing ELGs.

Second, EPA's analysis completely ignored *phosphate* fertilizer manufacturing facilities, even though the regulations set out at Part 418 Subpart A govern those facilities. EPA technical documentation shows that EPA maps SIC codes 2873 (Nitrogen Fertilizers) and 2875 (Fertilizer, Mixing Only) to the fertilizer manufacturing industry. Meanwhile, EPA maps SIC code 2874 (Phosphatic Fertilizers) to the phosphate manufacturing industry, a completely separate point source category regulated at 40 C.F.R. Part 422. Similarly, EPA maps NAICS codes 325311 (Nitrogenous Fertilizer Manufacturing) and 325314 (Fertilizer (Mixing Only) Manufacturing) to the fertilizer manufacturing industry but maps NAICS code 325312 (Phosphatic Fertilizer Manufacturing) to the phosphate manufacturing industry. As such, filtering EPA data for facilities in the fertilizer manufacturing point source category excludes facilities with NAICS and SIC codes indicating they manufacture phosphate fertilizer.

3. EPA did not adequately consider the health and environmental harms caused by water pollution from fertilizer manufacturing.

EPA did not explain its shift from prioritizing fertilizer manufacturing facilities and other leading sources of nutrient pollution to prioritizing industries with the largest discharges of *any* pollutant. The fertilizer manufacturing industry discharges toxic heavy metal pollution and nutrient pollution, which EPA has identified as "one of the most widespread, costly, and challenging environmental problems impacting water quality."[75] According to one estimate, the costs of nutrient pollution—which include lost recreational water usage, the declining value waterfront real estate, efforts to aid the recovery of threatened and endangered species, and drinking water treatment—could reach $2.2 billion annually.[76] EPA did not explain why it no

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[73] *See, e.g.,* Green Valley Chemical Corp (NPDES ID No. IA0003964); Koch Nitrogen Co LLC (NPDES ID No. IA0000302); CF Industries Nitrogen, LLC (NPDES ID No. MS0000574); Dyno Nobel Saint Helens Plant (NPDES ID No. OR0001635).

[74] *See, e.g.,* Agrium Kenai Nitrogen Operations (NPDES ID No. AK0000507); Cytec Industries, Inc - Brewster Plant (NPDES ID No. FL0132381); Mosaic - Bartow Plant (NPDES ID No. FL0001589); Mosaic - Green Bay Plant (NPDES ID No. FL0000752); Iowa Fertilizer Company (NPDES ID No. IA0052166 5600118); PCS Nitrogen Fertilizer, LP (NPDES ID No. LA0066257); Dyno Nobel, Inc. (NPDES ID No. MO0105783); Agrium U.S. Inc. (NPDES ID No. WA0003671); PCS Nitrogen Fertilizer, LP (NPDES ID No. GA0002071).

[75] Program Plan 14 at 5-2.

[76] *See* Walter K. Dodds et al., *Eutrophication of U.S. Freshwaters: Analysis of Potential Economic Damages*, 43 Env't 12 (2008).

longer considers nutrient pollution to be a priority area, and in light of the Agency's prior statements and findings, this decision appears difficult to justify.

Comparing discharges of *all* pollutants across industries, as EPA did in its cross-category concentration analysis in Preliminary Plan 15, likely led EPA to underestimate pollution from fertilizer manufacturing facilities, because it considered disaggregated nutrient pollution rather than overall nutrient loads. DMR data breaks nitrogen pollution into more granular subcategories based on the specific nitrogen compounds at issue. For example, nitrogen discharges may be reported as one of numerous parameters, including total kjeldahl nitrogen, organic nitrogen, ammonia, or nitrate, all of which are relevant to total nitrogen pollution. In its previous nutrient analysis, EPA compared reported and estimated amounts of *total nitrogen* across industries, rather than separating individual parameters.[77] By failing to aggregate these individual parameters and, thus, to consider total nitrogen pollution in its latest review, EPA underweighted the significance and quantity of pollution discharged by fertilizer manufacturing facilities in its cross-category concentration analysis. If EPA had considered total nutrient pollution, the fertilizer manufacturing industry might have emerged as a priority in September 2021, as it did in January 2021.

4. EPA's cross-sector review in Preliminary Plan 15 was inconsistent with the CWA.

EPA's decision to abandon its review of the fertilizer manufacturing industry also appears inconsistent with the CWA. The CWA requires that effluent limitations for toxic and nonconventional pollutants reflect BAT.[78] As explained above, therefore, EPA's annual review must evaluate whether existing ELGs do, in fact, reflect BAT.

To ground its review in the CWA's requirements, EPA should have (1) looked at parameters relative to the fertilizer manufacturing ELGs and (2) compared actual discharges to permit limits. Many of the existing ELGs for the fertilizer manufacturing industry are presented as *quantity* or *quantity per kg of product manufactured*, yet EPA considered only pollutant *concentrations* in its review. Looking only at pollutant concentrations does not provide information on how well fertilizer manufacturing facilities are controlling their pollution relative to the ELGs. A more reasonable approach would be for EPA to compare actual discharges of pollutants, in relevant parameters, to permit limits to determine whether facilities are discharging less pollution than the ELGs permit. If so, the existing ELGs likely are out of date and under-protective. Here, as explained above, at least one fertilizer manufacturing facility is discharging pollution at rates far below both the existing ELGs and more stringent water quality-based permit limits. The performance of this facility indicates that other fertilizer manufacturing facilities also

[77] *See* EPA, *EPA's Review of Nutrients in Industrial Wastewater Discharge* at 2-2 (Dec. 2020) ("The nutrient parameters reported in DMRs vary by industry and NPDES permit and may include total nitrogen, ammonia, nitrate, phosphate, total phosphorus, and/or other nitrogen or phosphorus species. To facilitate analyses and comparisons of the nutrient data, the Loading Tool calculates aggregated annual loads for total nitrogen and total phosphorus for a given facility, based on that facility's reported loads of individual nitrogen and phosphorus parameters. . .EPA imported the aggregated total nitrogen and total phosphorous DMR data from EPA's Loading Tool for calendar year 2018 into a set of static databases. . .to preserve the integrity of the data and support subsequent review of the pollutant loadings data.")
[78] *See* 33 U.S.C. § 1311(b)(2)(A).

may be able to reduce their discharges through the application of advanced wastewater treatment technology—something that EPA should consider when prioritizing industries for review and revision.

D. Fertilizer Manufacturing Facilities Impair Environmental Justice, further Supporting Revision of the Existing ELGs and Pretreatment Standards.

Water pollution from fertilizer manufacturing facilities disproportionately harms low-income communities and communities of color. Of the 204 facilities identified through EPA's ECHO database as likely to be in the fertilizer manufacturing industry, 40 are located within three miles of a population that is over 50 percent people of color, and 41 are located within three miles of a population that is over 50 percent low-income. In addition, at least 48 fertilizer manufacturing facilities are located in areas where people are more likely than 80 percent of the national population to suffer or risk suffering other environmental harms.[79] These data points suggest that reducing pollution from fertilizer manufacturing facilities could help to alleviate environmental inequities.

Consider Donaldsonville, Louisiana, which has three fertilizer manufacturing facilities within a seven-mile radius: CF Industries – Donaldsonville Nitrogen Complex ("Donaldsonville Nitrogen"), Mosaic Phosphates Co Faustina Plant, and Mosaic Fertilizer LLC Uncle Sam Plant. Donaldsonville Nitrogen—which produces ammonia, urea, urea ammonium nitrate, and nitric acid—is the largest fertilizer manufacturing facility in the country. CF Industries acquired the Terra Mississippi Nitrogen facility, located near Donaldsonville Nitrogen, in 2010 and completed a $2.1 billion expansion in 2016.[80] In 2020, CF industries announced a new $41.4 million capital investment in Donaldsonville Nitrogen to enhance nitric acid production.[81]

Water pollution from existing and expanding fertilizer manufacturing facilities in Donaldsonville harms a population that is largely low-income people and people of color. Of the 8,552 people living within three miles of Donaldsonville Nitrogen, 77 percent are people of color and 46 percent are low-income. In addition to water pollution, Donaldsonville Nitrogen poses other serious threats to the surrounding population. For instance, during Hurricane Ida, Donaldsonville Nitrogen reported releases of anhydrous ammonia, which is acutely toxic and can cause severe skin burns and eye damage. On a typical day, the facility may contain as much as 328 million pounds of anhydrous ammonia, making it a constant threat to those living nearby.[82]

The area within three miles of Donaldsonville Nitrogen ranks highly in terms of exposure to pollution of all kinds. Specifically, people living in this area already: (1) face higher exposures

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[79] This information comes from EJSCREEN indicator data in EPA's ECHO Database.
[80] *See* La. Econ. Devo., *CF Industries To Invest $41.4 Million At Donaldsonville Nitrogen Complex* (Sept. 30, 2020), https://www.opportunitylouisiana.com/led-news/news-releases/news/2020/09/30/cf-industries-to-invest-$41.4-million-at-donaldsonville-nitrogen-complex.
[81] *Id.*
[82] *See* Coming Clean, *Unprepared for Disaster: Chemical Hazards in the Wake of Hurricane Ida* (2021), https://www.comingcleaninc.org/assets/media/documents/Unprepared_for_Disaster_FINAL.pdf.

to lung-damaging particulate matter pollution; (2) have a higher risk of lifetime cancer due to inhalation of air toxics; (3) are more likely to be exposed to lead paint in their homes; (4) are more likely to be exposed to toxic air pollution; (5) live near more facilities using extremely hazardous materials that could create a danger; (6) live near more hazardous waste facilities; and (7) face greater exposures to toxic concentrations of water pollution *than at least 80 percent of the national population*.[83] The Ascension Parish of Louisiana, which contains Donaldsonville, is home to 14 major manufacturing companies producing chemicals, plastics, and fertilizers.[84] Principles of environmental justice demand that EPA closely scrutinize the fertilizer manufacturing industry for opportunities to reduce burdens on low-income people and people of color, including those living in Donaldsonville, Louisiana, and ensure that people likely to be affected by fertilizer manufacturing pollution have an opportunity to influence the Agency's prioritization decisions.

E. Additional Pollution from Fertilizer Manufacturing and Fertilizer Application Underscores the Need for Careful Review.

Not only does the fertilizer manufacturing industry generate significant water pollution, but it is also responsible for air and climate pollution that harms communities and environments across the nation. In addition, fertilizer *application* results in water pollution that compounds the harm of water pollution from fertilizer manufacturing. Thorough review and revision of the existing ELGs and pretreatment standards for the fertilizer manufacturing industry could help to reduce these other forms of pollution as well, resulting in meaningful benefits to human health and the environment.[85]

1. Fertilizer manufacturing generates air pollution that threatens public health and harms our climate.

The manufacture of nitrogen fertilizer is responsible for large emissions of greenhouse gases, stemming primarily from the production of hydrogen to make ammonia. Ammonia, which may be applied directly as a fertilizer or used as a building block to create other nitrogen fertilizers, is most commonly produced using the Haber-Bosch process to combine hydrogen and nitrogen.[86] Hydrogen, in turn, is commonly produced using the Steam Methane Reforming

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[83] *See Detailed Facility Report*, EPA, https://echo.epa.gov/detailed-facility-report?fid=110014466372.

[84] *See* Merrill Singer, *Environmental Health in Donaldsonville, Louisiana: Assessment of Community Attitudes, Perceptions, and Experience* (2010), http://jhlowery.org/wp-content/uploads/2016/06/Report-Final-Env-Health-Eth-Study.pdf.

[85] *See* EPA, *Preliminary Effluent Guidelines Program Plan 14* at 2-3 (Oct. 2019), https://www.epa.gov/sites/default/files/2019-10/documents/prelim-eg-plan-14_oct-2019.pdf. ("The EPA considers the combination of the amount and type of pollutants in an industrial category's discharge and the relative hazard (human or ecological health risks) posed by that discharge. This factor enables the EPA to prioritize rulemakings that could produce the greatest environmental and health benefits.")

[86] *See* EPA, *Development Document for Effluent Limitation Guidelines and New Source Performance Standards for the Basic Fertilizer Chemicals Segment of the Fertilizer Manufacturing Point Source Category* at 53 (Mar. 1974).

process, which generates methane and carbon dioxide pollution in at least three ways.[87] First, the Steam Methane Reforming process uses natural gas (mainly methane) as a feedstock, and some of this gas is released into the atmosphere.[88] One study found that ammonia plants emit an average of 0.3 percent of the natural gas they use, resulting in significant methane pollution.[89] Second, the Steam Methane Reforming process produces carbon dioxide as a byproduct; the process of creating 1 ton of hydrogen generates 2.16 tons of carbon dioxide.[90] Third, the Steam Methane Reforming process requires high temperatures and is energy-intensive, generating additional greenhouse gas emissions.[91]

In addition to harming our climate, the fertilizer manufacturing industry emits other forms of dangerous air pollution. In 2017, fertilizer manufacturing facilities accounted for 23 percent of total ammonia emissions attributed to large stationary sources, second only to electricity generation via combustion.[92] The fertilizer manufacturing industry also emits sulfur dioxide, hydrogen sulfide, and nitrous oxide, a greenhouse gas with roughly 300 times the warming potential of carbon dioxide.[93] Through atmospheric deposition, nitrous oxide emitted into the air can pollute the water as well.[94]

Air pollutants generated by fertilizer manufacturing facilities threaten human health. For example, high levels of ammonia can irritate and burn the skin, mouth, throat, lungs, and eyes.[95] Very high levels of ammonia can damage the lungs or cause death.[96] Ammonia also can combine with other compounds to form particulate matter and smog. Hydrogen sulfide exposure can cause irritation to the eyes and respiratory system as well as apnea, coma, convulsions, dizziness, headache, weakness, irritability, insomnia, and stomach upset.[97] And sulfur dioxide exposure can harm the respiratory system and make breathing difficult.[98]

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[87] *See* Seyedehhoma Ghavam et. al., *Sustainable Ammonia Production Processes*, Frontiers Energy Rsch. at 3 (2021).
[88] *Id.*
[89] *See* Amanda Garris, *100 Times More Pollution than Reported: How New Technology Exposed a Whole Industry*, Env't Def. Fund (June 21, 2019), https://www.edf.org/blog/2019/06/21/100-times-more-pollution-reported-how-new-technology-exposed-whole-industry.
[90] *See* Ghavam et. al., at 3.
[91] *See* Pinping Sun et al., *Criteria Air Pollutants and Greenhouse Gas Emissions from Hydrogen Production in U.S. Steam Methane Reforming Facilities*, 53 Env't Sci. Tech. 7103 (2019).
[92] *See* EPA, 2017 National Emissions Inventory Report, https://gispub.epa.gov/neireport/2017/.
[93] *Id.*
[94] *See* Nat'l Atmospheric Deposition Program, *Nitrogen: The Nation's Rain,* http://nadp.slh.wisc.edu/lib/brochures/nitrogen.pdf.
[95] *See Ammonia*, Ctrs. for Disease Control & Prevention, https://www.cdc.gov/niosh/topics/ammonia/default.html.
[96] *Id.*
[97] See *Hydrogen Sulfide*, Ctrs. for Disease Control & Prevention, https://www.cdc.gov/niosh/topics/hydrogensulfide/default.html.
[98] *See Sulfur Dioxide Basics*, EPA, https://www.epa.gov/so2-pollution/sulfur-dioxide-basics#effects.

2. Water pollution from fertilizer *application* compounds the harm caused by water pollution from fertilizer *manufacturing*.

Not only does fertilizer *manufacturing* generate significant water pollution, but fertilizer *application* also harms human health and the environment. For instance, in 2009, EPA found that 43 percent of phosphorus pollution and 66 percent of nitrogen pollution in the Gulf of Mexico was attributable to fertilizer application. As EPA explained:

> Even when fertilizers (in the form of manure or chemical fertilizers) are applied at agronomic rates, agricultural production of crops typically has an efficiency of less than 30 percent for nitrogen (based on Galloway et al. 2003). The nutrients not used by crops can volatilize into the air, infiltrate into ground water or run off the land with stormwater.[99]

Phosphorus and nitrate pollution of drinking water in the Upper Mississippi River Basin closely correlates to the amount of local cropland that is fertilized.[100] Thus, it is well established that field application of fertilizer has a detrimental effect on human health, a factor that EPA should consider in prioritizing the fertilizer manufacturing industry for review.

CONCLUSION

In Program Plan 15, EPA abruptly reversed its decision to prioritize review of the decades-old technology-based water pollution control standards governing the fertilizer manufacturing industry. The fertilizer manufacturing industry discharges nutrients and heavy metals, as EPA has previously recognized, and this pollution disproportionately harms environmental justice communities. In addition, fertilizer manufacturing and application degrade our climate, air quality, and surface waters. EPA's most recent analysis was inadequate to determine whether this industry's technology-based water pollution control standards warrant revision, and EPA's reversal decision conflicts with evidence indicating that revision is necessary and overdue.

The fertilizer manufacturing industry is one of many industries for which EPA has allowed technology-based water pollution control standards to languish far longer than federal law allows. Commenters urge EPA to reconsider its decision with respect to the fertilizer manufacturing industry and to begin fulfilling its statutory responsibilities to review and revise technology-based water pollution control standards without delay.

If you have any questions about these comments, please do not hesitate to contact Surbhi Sarang at (212) 284-8032 or ssarang@earthjustice.org, Alexis Andiman at (212) 845-7394 or

[99] EPA, *An Urgent Call to Action: Report of the State-EPA Nutrient Innovations Task Group*, at 17 (2009), https://www.epa.gov/sites/default/files/documents/nitgreport.pdf.

[100] *See* Soren Rundquist, *EWG Water Atlas Reveals Nitrate, Phosphorous Water Pollution in four Upper Mississippi Basin States Closely Aligns with Fertilizer Use on Cropland*, Env't Working Grp. (Aug. 31, 2021), https://www.ewg.org/research/ewg-water-atlas-reveals-nitrate-phosphorous-water-pollution-four-upper-mississippi-basin.

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